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စေတမာန်

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**Special Issue on
Water and Sanitation**

ရေနှင့် ရှင်းမှု
အထူးထုတ်



Health Messenger

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The procedures, explanations and treatments provided in this publication are based on research and consultation with medical and nursing authorities. They all reflect accepted medical practices. Nevertheless they cannot be considered as absolute and universal recommendations. The authors, the editor and the publisher disclaim responsibility for any adverse effects resulting directly or indirectly from the suggested procedures, from any undetected errors, or from the reader's misunderstanding of the text.

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Editorial

Dear Readers,

This issue is the result of joint efforts with WHO (World Health Organization), which is funding its printing costs.

Some articles in this issue aim at helping health workers as well as community members to learn more about water supply and sanitation, and how to control the negative health effects resulting from their surrounding environments.

The articles focus on water and sanitation, which is an important problem for refugees and migrant workers. We are providing information on different kinds of water supply, water-related diseases, waste disposal and rodent control.

Enjoy your reading!

Best regards,
Dr. Than
Editor

Health Messenger Magazine Program

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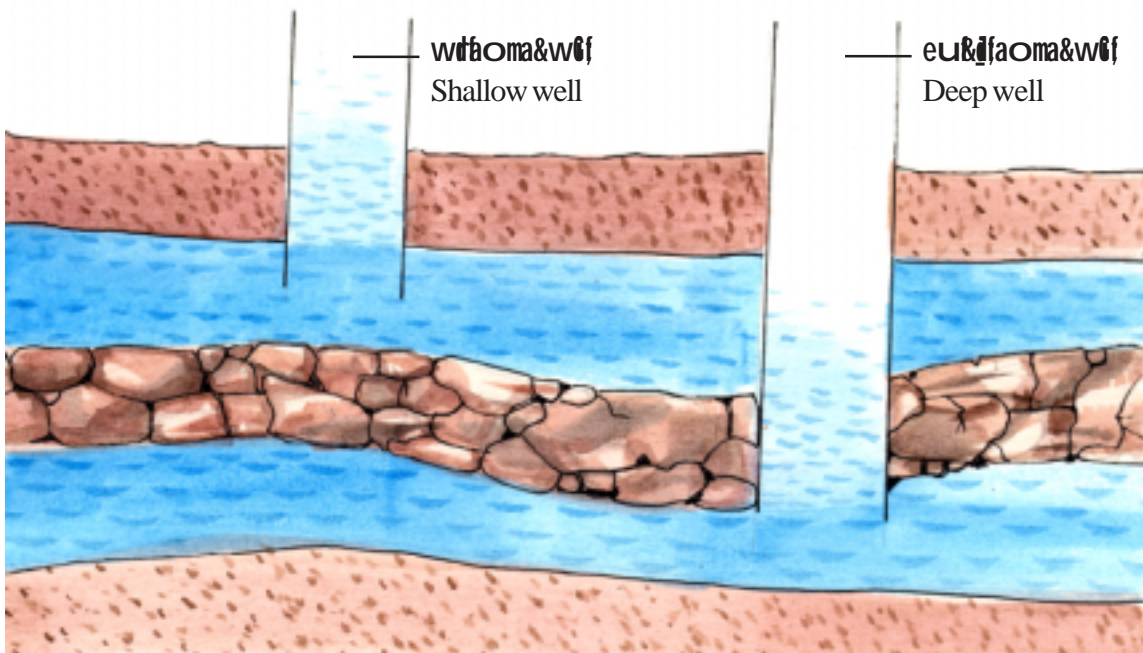
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Water Supply

Health Messenger Team



This article demonstrates the different sources of water supply and will help the medics, public health technicians and social workers in protecting the water points.

What are the different types of water?

Potentially, three types of water are available for water supply: surface water, ground water and rainwater.

What are the varieties of surface water?

The varieties of surface water are streams, rivers, lakes, ponds and reservoirs (dams).

of shallow ground water.

What are the main characteristics of surface water?

Surface water is generally heavily polluted, particularly during the rainy season. Its quantity also varies with the season. Most of the surface water needs complex treatment before use.



withoma&wlf - Shallow well

r&lf - Source: Quyen Tran

How many types of ground water are available for water supply?

Two main types of ground water are available for water supply. These are deep ground water and shallow ground water. Deep ground water supplies are boreholes, deep wells and deep springs. On the other hand, shallow wells, shallow springs and ground water near the water sources are different types

Nevertheless, certain catchment methods allow a significant improvement of water quality; for example, shallow wells dug close to riverbanks (river water could be filtered through soil before it gets into the well).

What are the characteristics of deep ground water?

The nature of deep ground water is clear



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and good bacteriological quality because of having been filtered by percolation (liquid passing through porous body) through rocks. Sometimes it contains substances, making it undrinkable because of its taste or because of toxicity. There is a little or no seasonal change in terms of quantity and quality.

What are the main characteristics of shallow ground water?

The main characteristics of shallow ground water is the depth of the water table (body of underground water). When the water table is high, there is usually a lower bacteriological quality. Water from less than 3 meters deep should be treated like surface water. It is also subject to seasonal variation in quantity.



*a&o, beyh- Water transportation
r&it - Source: Quyen Tran*

What are the characteristics of rainwater?

In non-industrialised regions, rainwater is relatively pure and may be consumed without treatment as long as it is collected with certain precautions, which are rainwater from a clean surface (tin roof, tent, plastic sheeting) and the first flow of rainwater is rejected.

Although rainwater rarely provides a regular supply, it may sometimes be a useful temporary or complementary supply (it may be a good alternative to heavily polluted surface water during the rainy season).

The exclusive consumption of rainwater without a complementary intake of essential minerals (such as iodine) causes problems in the long term period.

Rainwater dissolves the metal in which it is stored. Do not use containers or pipes made of copper, zinc or lead. Clay, cement or plastic containers are suitable.

What is the best source of water supply for the refugee situation?

When settlement begins, surface water (the most polluted or the most easily polluted) is often the only supply available. It is, therefore, important to concentrate on the problem of water as a top priority.

In practice there is rarely a choice among these different sources of water,

PRIORITIES IN TERMS OF WATER SUPPLY

- Find out how the people go to collect water and where they defecate
- Designate defecation site away from water points
- Take specific steps to PROTECT WATER POINTS
- Determine the amount of water available
- Look for additional sources of water
- Create a reserve water stock
- Check water quality
- Install a treatment plant if feasible



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particularly in emergency or refugee situations.

Water points protection

All the protection measures aim at preventing the introduction of faecal germs into the water either directly or indirectly by dirty soil falling into the water, etc.

- **Protection of waterway**

Organise the use of the waterway according to environmental health considerations. The point used for collecting water should be upstream of all other uses. Surface water



nphrfaoma& - Polluted water

r&i| - Source: Quyen Tran

is always difficult to protect. If possible, use other sources such as wells, springs, and boreholes.

- **Well protection**

Surround the well with a fence against animals. If the well is used to water animals, make a channel to take water to a groove situation outside the protective fence. Forbid the use of personal water containers. One rope with a single container should be provided for this use. Install a winch or similar system so that the bucket and rope are not laid on the ground and so that people do not lean over the well. Keep sources of pollution such as latrines, at least

30-50 meters away from the well and downhill from it if there is a slope (make sure there are no fissured rocks).

Make the upper part of the well watertight to at least 3 meters deep, install an apron, a concrete slab on the head wall, and drainage of the surroundings, etc. Cover the well, and if feasible, install a pump (hand or motor-pump) including a plan for maintenance and the supply of spare parts.

- **Spring protection**

Install a system which prevents water from pooling or collecting (standing) at the spring (collect the running water with a split bamboo, for instance). Erect a protective barrier around the stream about 10



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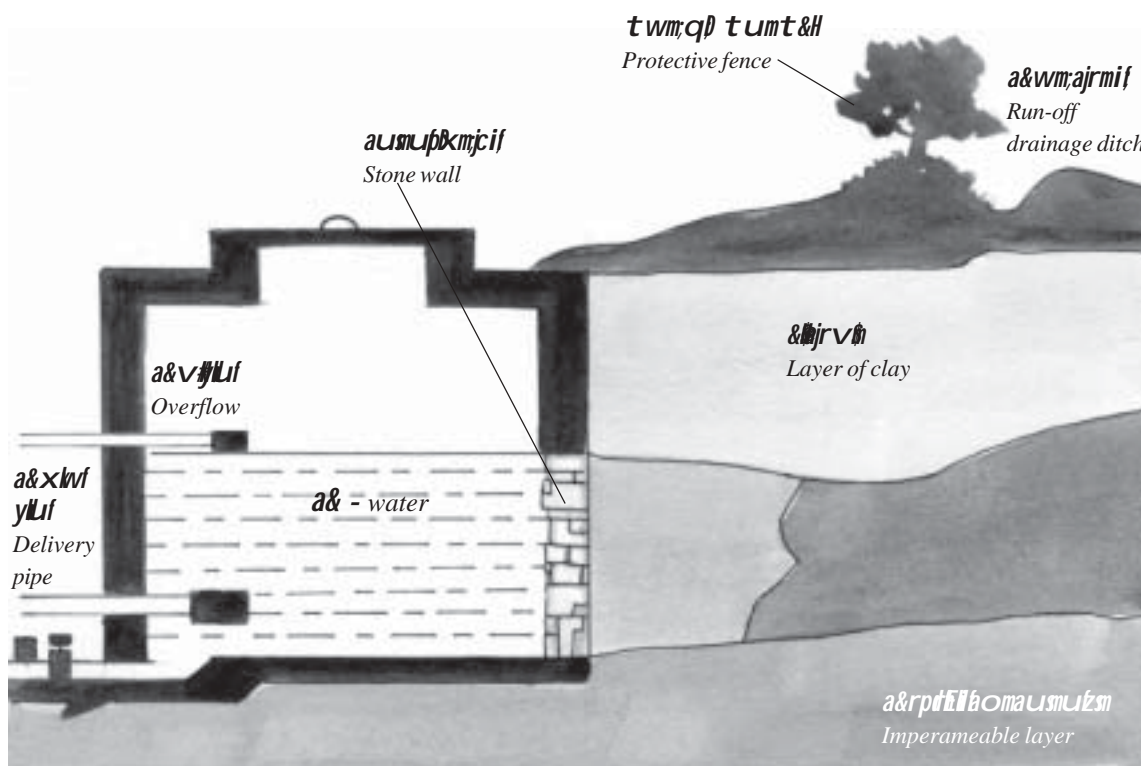




metres above it. Dig a drainage channel to keep it from being polluted by run off.

Build a spring box as soon as possible.

Consumption of clean water can only be achieved by action at all levels, with a global programme of water point protection (safe water supply), excreta control (utilisation of



Spring box side section
Source: MSF

Pollution at the source of water or during collection transporting is nevertheless more dangerous than pollution at home: it affects the whole population at once and consequently encourages large-scale epidemics.

hygienic latrine) and long-term health education.

Reference:

Public Health Technician in Precarious Situation, MSF

POLLUTION

Faecal pollution of water may occur at a number of stages.

For example, water from a well may be:

- polluted at water table (body of water).
- polluted inside the well from soil, run-off, etc.
- polluted during transportation from dirty containers, dirty hands, etc.
- polluted during storage in the home from insects, dust, etc.



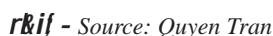
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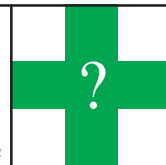
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Common Water-Related Diseases

Health Messenger Team



This article explains about the common diseases along the Thai-Burmese border that are either transmitted by or linked to water. It also highlights the different routes of transmission, the signs and symptoms, as well as preventive measures.

There are many common diseases, which are related to water. These diseases can be classified according to the link they have with water. The diseases, which are transmitted through consumption of contaminated water by mouth or the use of it for food preparations are called **water-borne diseases**. Certain diseases obtained by contact with water are named **water-based diseases**. In this case, the agent causing the disease can penetrate the skin. Any water site can be a place, where many disease-carrying insects breed. Most diseases are transmitted through mosquitoes. These diseases are classified as **water-related vector-borne diseases**. Some diseases can be prevented if there is a sufficient amount of water supply and it is used for good personal hygiene. These diseases are labelled as **water washed diseases**.

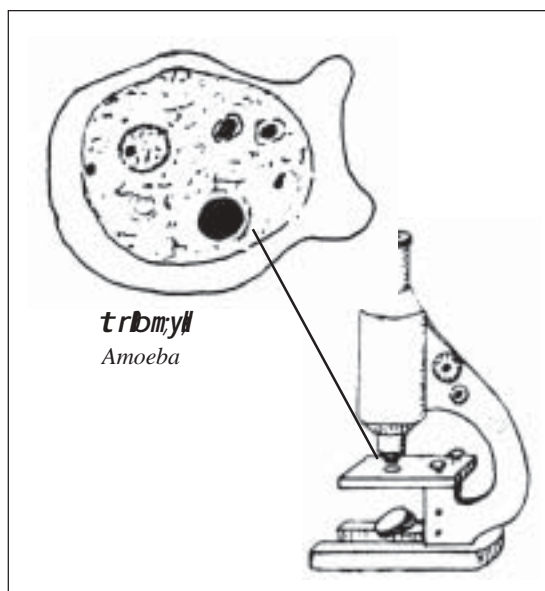
Water-borne diseases

Most common water-borne diseases are diarrhoeal diseases including dysentery, cholera, typhoid, hepatitis A, ascariasis, amoebiasis and other protozoa diseases. These diseases are transmitted through the faecal-oral (anus to mouth) route of transmission. Some chemicals (high content of Arsenic and Lead) can also cause water borne diseases.

Diarrhoea:

Diarrhoea refers to a group of symptoms such as watery stools, loose motions and

abdominal pain often accompanied by malaise. Depending on the disease, the patient may or may not have fever and stools may or may not contain blood. Most gastro-enteritis or acute diarrhoeal diseases are due to faecal-oral contamination. Diarrhoea is very dangerous for children because of dehydration and malnutrition, and may lead to death. **Dysentery (bloody diarrhoea)** is an inflammation of the intestines with blood and/or mucus in the stools. (See: "Practical Guidelines for Diarrhoea" in this issue)



Amoebiasis:

A protozoan named *Entamoeba histolytica* is the causative organism for this disease.



Transmission:

The amoebae in the large intestines make many cysts, which are passed in the stool. These cysts are infective if swallowed. Direct faecal-oral spread can occur, but much more commonly, faeces with cysts contaminate food or water. When the food or water is swallowed, the cysts develop into amoebae in the intestine.

Signs and symptoms:

Abdominal pain, vomiting and fever accompanied by diarrhoea that can range from watery stools to a dysenteric syndrome of bloody stools containing mucus and pus.

Prevention:

Cases and carriers should not be allowed to handle food. They must wash their hands after using the toilet. Use proper toilets, which do not contaminate water and food. Cook food properly and keep food covered.

Cholera:

Causative organism is a bacterium (*Vibrio cholerae*). Many people do not develop the clinical signs or may have only a mild disease.

Transmission:

Cholera organisms are passed from the gut (gastrointestinal tract) into the faeces or vomits. The organisms then spread to the mouths of other people.

Contamination of food by contaminated water, hands, and flies, can also occur.

Signs and symptoms:

In severe cases, this disease causes rapid dehydration (within hours), shock and death. After normal faeces, large amounts of watery stools may pass in the first few hours. Stools may look like boiled rice water. Vomiting and cramps can cause severe abdominal pain.



Safe water supply

Prevention:

Good sanitation, safe water supply and general hygiene will help prevent cholera. Tetracycline can be used as a prophylactic drug for staff and contacts during a cholera epidemic. (Tetracycline and Co-trimoxazole resistance has been reported-Lancet 349:924, 1997; review Lancet 349-1825, 1997). Report all suspected cases of cholera to the concerned Health Officer in your area.

Typhoid fever:

The causative organism is a bacterium (*Salmonella typhi*).

Filtering Water in Cloth May Cut Cholera

Researchers say that simply filtering water through old cloth made of gauzelike cotton fabric may be good enough to reduce cholera cases by about half in rural villages.



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Transmission

The faeces or urine of an infected person may contaminate food or drinking water. This may occur if they handle food, or if they do not use a proper toilet. It may also occur if the water supply is not safe or contaminated with excreta or is not treated. Sometimes flies may carry the bacteria from faeces to food.

Signs and symptoms

First week: general symptoms of infection; for example, malaise, headache, abdominal pain, constipation and fever.

Second week: condition gets worse. Diarrhoea and rash of red spots may be seen.

Third week: symptoms and signs become more severe. Patient may become unconscious and die. Perforation of intestines may be seen. Haemorrhage may occur in small intestines.

Prevention

Patients and carriers should not be allowed to handle food for others. Safe community water supply, proper disposal of faeces and urine is essential. Immunisation using typhoid vaccine might be recommended for health staff.

Hepatitis A

The causative organism is a virus (HAV- Hepatitis A Virus). Many people in developing countries have had HAV during childhood and are immune.

Transmission

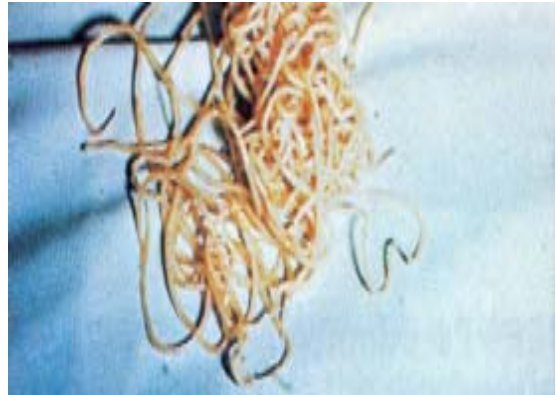
Faecal-oral route of transmission by ingestion of contaminated food and water.

Signs and symptoms

First week - mild fever, malaise, loss of appetite, vomiting and mild right upper abdominal pain (liver area). After first week: dark urine and jaundice (yellow skin).

Prevention

Provide safe water supply and use sanitary type of latrines.



Adult Ascaris - Ascariasis

Ascariasis

It is caused by a worm (ascaris or roundworm). Adult worms are about 15 - 25 cm in length and live in the small intestine.

Transmission

The adult female worm lays thousands of eggs in the intestine, which pass in the faeces. Eggs become infective after two weeks of incubation in damp soil. Transmission happens when an infective egg is swallowed from dirt, water or food. Children playing in contaminated soil is a common cause of infection.

Signs and symptoms

Children are infected more often and more severely than adults. There are no obvious signs and symptoms. If there are many worms, mild diarrhoea, abdominal



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Water-based diseases



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O r s ; o n f t a u m i h y g u l y l v # i t a & j y m ; u l l x l
a z g u l l u l l x b l o i h a m u f u o n ?

a&m*guQ%mr

a o g t m ; e n f j c i i / a r m y e f E f f e , j c i i / r l a o j c i i p o n f
w l z p o n ? a o g t m ; e n f a o m a & a j y m i f v e m t m ;
v l u l o l s v a u m i f a & m * g b n l [k o w f s v l y d
a u m i f r e p h u b r a y ; o i b o n f r , l v ' l u Q o n p
c e f w f u l l D e f l v d E s l v w d o l v y w l v o l s v f
a u m i h a m * g w o l v # i r b i f a Z m a q j z i h u b a y ;
o n ? o l h o m u l l D e f x r o l v y w l v f a w o l v # i f
u l l D e b u f ' l v d o l v y l l t p o l y l l w f l u b
a y ; E l l o n ?

a&m*gumug jci

t t f o m u l p e p l w u s o l p c i i / t t f o m r & g u r p i f r ;
u l l p e p l w u s a j r j r l y j c i i / j z p E l l v # i a j r u l a y : w f
v r f a v # u l y g u z e y p l y g r e f e b h a u m i t c i i o n f
v n f v l t y l v o n ?

& l u b e f y m ; a u m i f

r , l v ' l u Q o n p c e f w f a e a o m o l w l v f y g m a * g
r w p f O u p w r E l l e f a t n a y o l l c w p f w l v l v n f
p r f o y a w o o n ?

a&ESlquEg l y l r ; r s v q i b , h a q m i h o m a & m * g r ;

a & E S l q u E g l y l r ; r s v q i b , h a q m i h o m a & m * g
r s ; r h a o f v e l w y l a u (a & m * g i l u z s ; E s f q i h a c x m u f
a & m * g r ; j z p y g n ? T a & m * g r ; u l p u f j y e f r ; y l l n
y l l y a x o n ? t b , h a u m i q l l o m f y l b , h a q m i x m ;
a o m t t r s (v o l l [l v a u m i l w p f r s r l) / a & m * j z p f
a p a o m y l r ; a u m i (u y l y g o l l [l v f A l l f y p l y) E s h
a & m * g l b , h a q m i b n l y p P n f (t r s ; t m j z i f h a m * g l



discomfort and distension may appear. In rare cases, it can cause intestinal obstruction or pneumonia and asthma if larvae travel to the lungs.

Prevention

Systematic burying of faeces if there is no latrine, good hygiene practices such as washing hands before eating and preparing food, regular deworming, use of sanitary type of latrines or safe burying of stools, safe water supply and various good hygiene practices can prevent the disease.

Water-based diseases

The cause of these diseases is the pathogenic agent in water, which is transmitted through skin penetration. People who have no access to latrines, and defecate without burying their stools and do so near the water sources, are responsible for these diseases.

Hookworm

Adult worms are about 1 cm in length. They live in the upper small intestine of humans. They are attached to the intestinal wall and suck blood and protein from there. Infestation is very frequent in children and is very damaging to their health as it can cause malnutrition and serve anaemia. A high rate of infestation has also been found in women of reproductive age. Anaemia is dangerous for pregnant woman.

Transmission

In moist soil, fertilised eggs develop into larvae and pass through the skin.

Signs and symptoms

Anaemia, tiredness and dizziness. All

migrants with anaemia can be assumed to have hookworms and should be treated. In Maela Camp, pregnant women with hookworm in the second and third trimester of pregnancy are given treatment with Mebendazole. But if a woman in the first trimester is found to be infected with hookworm, she can be treated at the beginning of the second trimester.

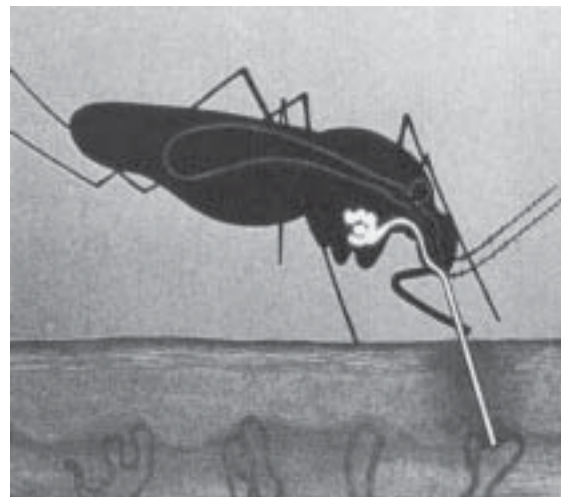
Prevention

Use of latrine or burying stools. If possible, use foot wear while walking on the ground. Regular deworming is necessary.

Flukes

In Maela Camp, (flukes) *Paragonimus westermani* and *opisthorchis* have been positively identified in residents.

Water-related, vector-borne diseases



rkif - Source: TALC

Water-related, vector-borne diseases include dengue fever, malaria and filariasis. The transmission of these diseases is more complex because it involves a host (a person or an animal), a pathogenic agent (a parasite or a virus) which gives away the disease, and a vector usually a mosquito that carries the pathogenic agent. The vector is usually a mosquito..



Malaria

It is caused by protozoa.

Transmission

Mosquitoes are infected by sucking up the blood of an infected person. After development in the midgut of the mosquito, sporozoites can be transmitted to another person through the bite of a female mosquito (*Anopheles*). The mosquito usually bites at dawn and dusk. The *Anopheles* mosquito likes the forest and mountain areas including coastal mangroves.

Signs and symptoms

Usually begins with a few days of vague ill health. Then attacks of fever occur with chills and heavy sweating occurs followed by headache, vomiting, delirium. Attacks are usually repeated during several days. Then the disease leads to a chronic stage that may last years before the patient develops immunity. Fully developed immunity is rare in areas of low transmission like most of South-East Asia but common in higher transmission areas of Sub-Saharan Africa.

Prevention

Protection from mosquito bites. Use of bed nets and covering the skin with long sleeves and trousers. Eliminate mosquito breeding grounds.

Dengue fever:

The causative organism is dengue virus. This disease is one of the killer diseases of children.

Transmission

This disease is transmitted by the bite of

the *Aedes aegypti* mosquito. *Aedes* mosquito is a day biter and lives around the house and breeds in water containers such as old discarded tires and coconut shells. Dengue is an epidemic disease causing an increased number of cases at certain periods of the year, usually during the rainy season. An outbreak can be experienced every two to three years.

Signs and symptoms

Clients may or may not have symptoms. It usually starts with fever and headache. Then the headache worsens with severe joint and back pains. Usually there are rashes on the skin. The disease can lead to haemorrhagic fever. Bleeding spots may appear on the skin. It can lead to shock and even death.

Prevention

Preventive measures are more or less like malaria prevention. Eliminate all breeding sites around the house. Bury the rubbish because it can become breeding sites. Keep all water containers covered.

Filariasis - *Qijula&m*g*



rbif Source: WHO



t u s v r s n ; w f i a e x l l b n ? t y l l f a ' o w f i
T a m * g n f ' l u Q v j z p a o m t a u m i f w p t z p
o n f

u l p u j y e t r y l l

j c i f s n ; u l l j c i f z i l z b v ; & D , m y l a u m i f t a u m i f
a y g u t p r s n ; o n f u l p u j y e t r y l l ; o f t r o n ?

a & m * g u Q % m r n ;

t c l a o m a & m * g l l & b r s n ; o n f E p a y g i f r s n ; p h
a & m * g u Q % m r n j b a e o n f v u Q % m r n j v f i t z n ;
w u j c i f E s h v i l t a u m r s n ; o l l [l v i v i l t u s v i
r s n ; a & m i f , r j c i f j z p b n ? E p a y g i f r s n ; p h u m v m
a o m t c g x i l l ; o b m q l a o m v u Q % m r n
c E < m u l l i . t c l a e & m r s n ; (v u l a j c / a , m u l n ;
u y l y , f t w l r e f r i b m ; r s n ;) w f e m w m & s n a z g
a & m i j c i f j z p b n ?

a & m * g u m u c j c i f

j c i f s n ; u l l x e f o d j c i f E s t c E < m u l l l u j c i l u l j c i f r s
u m u c j c i f - t o w f r s n ; v j c p o w j c i f / j c i f v m E l l
r u l u E l l h t m i f a q ; r s n ; v l j c i f E s h j c i a x m i f r s n ;
t o h y l j c i f o n f t u s l y g o n ? q i h j c a x m u f
a & m * g t j z p r s n ; a o m a ' o w f i v l w l f u l l q i h j c
a x m u h a m * g u b a q ; w l u h u l j c i f u l l a x m u c h
t m ; a y ; y g o n ?

a & a q ; r r v l l v m u j c i f r a o m a & m * g s n ;

a & u l l v m u p b o m l a & a q ; j c i f / a v # t z o v j c i f /
a & c l j c i f E s h u l l h a o e s f a & j y k v j c i f j z i h v x k
t w f i w f i a & a q ; r v l l v m u j c i f r a o m a & m * g
r s n ; u l l u m u c j c i f ; q l E l l y g o n ?

r s u t r i p y a & m * g

e m v m & s n r s u p e m i c i f w p r l j z p b n ? u v l u r l l f
' D , m y l a u m i f r s u p t a r s y g a & m i j c i f j z p b n ?
a & m * g z p l y d u m & s n p b n a q ; u b r r j y k v l y g u
r s u p l u e f o f t r E l l y g o n ?

u l p u j y e t r y l l

r s u t r i p y a & m * g l l a o m v e m . r s u p t s k u f
a o m t & m r s n ; (r s u h c s p o n) a e m u l v l w p a , m u f

q b l v u h c s n i f r s n ; / r s u E h o l w l y D g s n ; / v l t o h
t a q m i f p n i f r s n ; r s v q i f a & m u b o t r y g u u l p u f
j y e t r y l l ; E l l y g o n ? , i a u m i f r s n ; o n f T a & m * g l
o , h a q m i f y e t r y l l ; a p & m w f i t i f w e r s t a & ; u d
a o m t y l l r s y o i a e o n ?

a & m * g u Q % m r n ;

t p w f i r s u l v l e l y d r s u & n i u r n (o m r e f s u l
p e m i c i f) / w p l v c e l e # u m a o m t c g t a y : r s u t l
t w f i y l l w f i a o ; i , h o m y e f a & m i f r l c l a & m i l l
a o m t z h v ; r s n ; j z p a y : v m r n ? j z p a e o m r s u t l
b u l w f i j y n h a w l l b n ?

a & m * g u m u c j c i f

w u l l h a o e s f a & ; t j y k t r h s n ; v l y a q m i j c i f j z i h
v n f a u m i f / v u E s r s u E h u l l q y j y m z i h r e f e f
a q ; a u m i c i f j z i h v n f a u m i f T u l p u f a & m * g u l
u m u c j E l l y g o n ?

O h a m * g (Scabies)



r & i f - Source: TALC

a v s a u m i j z p l y d r a p o n f x l l v r s n ; o n f t a & j y m ;
u l l x l a z g u D i h a m u l y d O r s n ; O c s o n ?

u l p u j y e t r y l l

O h a m * g l a o m v e m E s t e d u y k d w e x l l j c i f / v e m
. t o w f t p m ; r s n ; u l l , l l o w q i j c i f r s n ; o n f
O h a m * g u l l v c l u p h u l p u h a p o n ? T O h a m * g n f
t h i v f i w p h , m u j z p l y g u t l l a t w b e t h o m ;
r s n ; t m ; v l u l u l p u j y e t r y l l ; a v l l b n ?

a & m * g u Q % m r n ;

O h a m * g l l a o m a e & m r s n ; w f i , m , j c i f j z p r n f
v u l z o g E s h j c z o g . t a & j y m ; a y : w f i a o ; i , h o m
c l l l u l u a v ; r s n ; a y : v m r n f a & m * g z p l y d r a o m a e

Filariasis is caused by one of several different types of thread-like worms (filaria). The worms live in the lymph nodes. It is one of the causes of disability in the tropics.

Transmission

Larvae of the worms are transmitted to patients through the mosquito bite.

Signs and symptoms

Some infected people may not show signs and symptoms for years. Filariasis may present with fever and inflammation of the lymph vessels and/or lymph nodes. The most obvious signs may appear after many years, showing chronic oedema of some parts of the body (limbs, scrotum, breast) and is called elephantiasis.

Prevention

Mosquito control and personal protection from mosquito bites with clothing, repellents and mosquito nets are helpful. Mass treatment in endemic areas is recommended.

Water-washed diseases

Sufficient amounts of water usage such as cleaning, washing, bathing and hygienic practices of the community can prevent water-washed diseases.

Trachoma

A chronic form of conjunctivitis, which is a chlamydia infection of the conjunctiva. If not treated properly, it can cause blindness over time.

Transmission:

It happens when an eye discharge from an infected person is passed on to another through fingers, towels and



scripf Trachoma

r&i - Source: TALC

personal effects. Flies are probably very important in spreading the infection.

Signs and symptoms

It begins with red and watery eyes (ordinary conjunctivitis). After a month or so, small pinkish-gray lumps can form inside the upper eyelid. Pus may be seen on the affected eyelid.

Prevention

Good Hygiene and regular washing of the face and hands with soap and water can prevent this infectious disease.

Scabies

The causative organism is a mite, which penetrates the skin to lay eggs.

Transmission

This disease can be contracted through close contact with infected persons and using clothing of infected persons. It usually infests all the people living in the same house.

Signs and symptoms

The infected body parts are itchy and



small skin burrow lesions usually appear on the web of the hands and feet. The affected body areas are the fingers, arms, wrists, elbows and the pubic (lower part of the trunk) region. The face is not affected in most cases.

Prevention

Good personal hygiene and regular washing will prevent this disease. Scabies rarely affect communities where sufficient quantities of water are available and people wash regularly.

Prevention of water-related diseases

All the above-mentioned diseases are preventable through, proper hygiene. In other words, good practices in water usage, food preparation, faeces disposal, healthy behaviours and life-styles are necessary.

Prevention

A pathogenic agent can enter the body through various pathways or more

scientifically, the transmission routes. Faecal-oral diseases have various transmission routes such as from fingers, foods, fluids, flies and faeces to mouth. For water borne, water-based and water-related, vector-borne diseases, prevention can be done by breaking transmission routes. For example, if people wash hands regularly, cook food thoroughly, and boil drinking water, the transmission routes of certain water related diseases will be cut and these diseases will be prevented.

If people sleep under a bednet to cut the transmission route (i.e. to prevent a bite from the malaria vector anopheles mosquito), it will prevent malaria.

For water-washed diseases, to avoid scabies, people should use water to wash regularly and that will prevent the mite from spreading from one to another.

Again it is easy to see from the above examples that following hygienic practices and adopting the appropriate life styles and behaviours will prevent diseases.

Prevention of Water and Sanitation-Related Diseases

- Make sure that people have access to an adequate quantity and quality of water in order for them to practice proper personal and household hygiene. This may require improving the water supply system.
- Make sure people have access to properly built latrines and know the importance of using the latrine every time they defecate and practice it.
- Set up a water supply system for people to wash so that they do not need to enter a lake or pond, which will increase their chance of getting infected.
- Make sure that people are aware of the importance of good personal and household hygiene and make sure that they are practicing it, as well.
- Make sure that people are aware of vector-related diseases, and that they know and practice ways to prevent them from contracting the diseases.

Source: Quyen Tran



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A cartoon illustration of a baby sitting on the ground, looking down at a puddle of yellow liquid. The baby is wearing a white shirt with red stripes and dark shorts. The background is a soft, yellowish-orange wash.

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Practical Guidelines for Diarrhoea

Health Messenger Team



Diarrhoea is common. Many children die from it every year and it is especially dangerous in children under 5 years of age. Fortunately, we can prevent diarrhoea. If you treat children with diarrhoea carefully, very few of them will die.

1. What is diarrhoea?

Three or more loose or watering stools passed in a day is defined as diarrhoea. There are two types of diarrhoea, classified as acute and chronic. Acute diarrhoea starts suddenly, and may continue for several days. It is caused by infection of the bowel. Chronic diarrhoea is diarrhoea that lasts for more than two weeks.

2. Why is diarrhoea dangerous?

Diarrhoea is dangerous as it can cause under-nutrition and death.

Death from acute diarrhoea or dysentery (bloody diarrhoea) is most often caused by loss of a large amount of water and salts from the body. This loss is called dehydration and electrolytes (components of salt) imbalance. Diarrhoea is more serious in people who are undernourished. It can make under-nutrition worse. During diarrhoea, nutrients are lost from the body and a mother may not feed a child, who has diarrhoea. Appropriate food should be given to children who have diarrhoea, as soon as they can eat.

3. How does diarrhoea cause dehydration?

The body normally takes in the water and salts it needs through drinks and food (intake). It normally loses water and salts through faeces, urine and sweat (output).

When the bowel is healthy, water and salts

pass from the bowel into the blood and the body can use these water and salts. When there is diarrhoea, the bowel does not work normally. Less water and salts pass into the blood, and more pass from the blood into the bowel. Therefore, more than the normal amounts of water and salts are passed out of the body in the faecal matter.

This larger than normal loss of water and salts from the body results in dehydration. It occurs when the output of water and salts is greater than the intake. Dehydration can be made worse by vomiting, which often accompanies diarrhoea.

Dehydration occurs faster in infants and young children, in hot climates, and when a person has a fever.

4. What are the most important factors in the treatment of diarrhoea?

The most important factors in the treatment of diarrhoea are:

- **to prevent dehydration from occurring;**
 - Dehydration can usually be prevented at home if the client drinks more fluids than usual as soon as diarrhoea starts. Food-based fluids, for example, gruel, soup, or rice water, can be used. The fluids recommended for prevention of dehydration at home will depend on:
 - a. the availability of a suitable food-based fluid;
 - b. the availability of salt and sugar;



t r s n; on f u s f r m p b j i l t v l y l y b e y g u ± i f w l s
w q i f a & E s f i g v q m; r s n; u l h o f x b l y l q m i a y; o n?
x l s v q i l u l l t E < m r s l t y b o v l t o l y l o n? O r f a v # n
O r f y s u j z p l y g u t r s n; on f u s f r m p b j i l t v l y l u l
r v l y E l l h a w m l y g a o f x b l h a & E s f i g v q m; r s n; y l h q m i f
a y; r a v s n e n f o t r; y l u l l t E < m. t j y i b u b l r p i E s h
t w l x l u b t r; o n? T e n f j z i h o m r e x u l y l l a & E s h
" g v f q m; r s n; on f u l l t E < m. t j y i b u b l r p i E s h t w l
q l h l b t r; o n?

T u b l h o m r e x u l y l l a & E s f i g v q m; r s n; q l h l b t r;
j c i f j z i f a & " g v t e f a j c m u j c i f u l l z p a p o n? u l l t E < m
r s a & E s f i g v q m; r s n; q l h l b t r o n f a o m u b l o n x u l
(u l l t E < m x b l l o i b o n x u l) r s n; y g u T u b l h a & " g v f
c e f a j c m u j c i f u l l z p a p o n? O r f a v # n O r f y s u j c i f E s h
t w l w l j z p l w w h o m t e j c i f o n f a & " g v t e f a j c m u f
j c i f u l l y l l h l q l l o g a p o n?

w p E s h t m u l u a v; r s n; E s h u a v; i, f s n; y l t l u f
a o m & m o d w l & b n h e & r s n; E s h v l w f t z s n; & g u t a &
" g v t e f a j c m u j c i f o n f y l l t j z p j r e b n?

4) O r f a v # n O r f y s u h a m * g u l u b r a y; & m v f b, f t & m r s n; o n f t a & ; u l q l l z p b v l

O r f a v # n O r f y s u h a m * g u l u b r a y; & m v f t a & ; j u d
q l h o m t & m r s n; r f n

- j z p E l l v # h a & " g v t e f a j c m u j c i f u l l r j z p l u m u g f
w m; q l j c i f /
a & " g v t e f a j c m u j c i f u l l v e m o n f O r f a v # n
O r f y s u f j z p b o n E s h t & n f s n; u l t g w l l f x u l
y l l h o m u h a y; j c i f j z i h t d f f y i f u m u g f w m;
q l E l l b o n? O y r m t m; j z i h - a & r s n; r s n; y g
a o m t p m; t a o m u f s n; q l l y l w l p g f y l w l

x r i f a & p o n f w l u l t o l y l E l l b o n? t d w l f
a & " g v t e f a j c m u j c i f u l l r j z p l u m u g f w m;
q l h e f a y; o i h o m t a & r s n;
u) o i h a v s h o m t & n f s n; r s n; y g o m t p m;
t a o m u f s n; & & E l l f /
c) q m; E s h a & & E l l f /
) v l x l h q; & l l a q; c e f o l h v u l v f r E l l f E s h
C) " g v f q m; x l w l f s n; (O R S) & & E l l f - t a y;
w l f r w n l y g o n?

- a & " g v t e f a j c m u j c i f j z p l v m y g u v s i f r e p h E s h
a u m i f r e p h j y l p l u b a y; j c i f /
a & " g v t e f a j c m u j c i f j z p l v m y g u v l e m u l l
a q; u b r c l l h e f t w l f v l x l u s f r m a & ; v l y f
o m; x l h o l l l w l f u s f r m a & ; X m e o l y l h q m i f
a y; y g a & " g v t e f a j c m u j c i f u l l t a u m i f q l
u b e n f r h " g v f q m; x l w l (O R S) r s a z n x m;
a o m a z n & n u l l y g p y f s w l u j c i f j z p l y g o n?
a & " g v t e f a j c m u j c i f u l l u b & e f t w l f " g v f
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E l l h o m t p m; t p m e n f e n f j c i f a u l; o i l y g
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O r f a v # n O r f y s u j z p p o l u q l h l b t r; c h o m
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e, l a, m u l r w l v 19 & u f 2004 - O r f a v # n a & m * g n f w p E s h # f u a v; 2 o e f c e l t o u r s n;
u l l q l h a p o n? q l l b n r f n w a e v # f u a v; 5 a x m i t e l o n f O r f a v # n a & m * g u m i f a o q l h u & o n?
x l t t j y i f r a & r w l u E l l h o m u a v; w l l t m; O r f a v # n a & m * g u m i f a e x l l f a u m i f j z p a p o n? , l l q u f t z l
t q l l t & / a & / o e f s f a & ; E s h q u E g h o m O r f a v # n a & m * g u m v O r f a & m * g w l u l z l u h a m * g r s n; a u m i f t p m; t
p m c h l y j c i f E s h t j c m; a & m * g l p m; a e & o n f u a v; r s n; o n f O p h y x r a & m * g y d a o q l h u & o n?



- c. the access of local people to health services; and
- d. availability of oral rehydration salts (ORS)

dehydration, ORS should always be used, whenever possible.

- **to treat dehydration quickly and well if it does occur;**

- If dehydration occurs, the client should be taken to a community health worker or health center for treatment. The best treatment for dehydration is oral therapy with a solution made with oral rehydration salts (ORS). For treating

- **to feed the client.**

- While the client is ill with diarrhoea, he or she should be offered small amounts of nutritious, easily digestible food. The extra fluids given to the client do not replace the need for food. After diarrhoea has stopped, an extra meal each day for a week will help the child regain the weight lost during the illness.

WAYS TO PREPARE ORS SPECIAL DRINK

ORS ခါတ်ဆားဖျော်ရည်ပြင်ဆင်နည်းများ။



Figure 1
ORS Special Drink from the prepared packet

ORS ခါတ်ဆားထုပ်မှဖျော်ယူနည်း။



Figure 2
ORS made from 4 level teaspoons of sugar and 1/2 a level teaspoon of salt dissolved in 1 litre of clean water.

သန့်ရှင်းသောရေ ၁ လီတာတွင်ဆားလွှက်ရည်ခွက်တဝက်နှင့် သကြားလွှက်ရည်ခွက် ၄ ခွက်ထည့် ပြီးဖျော်နည်း။



Figure 3
If spoon and litre container are not available, the ORS drink can be prepared by a handful of about this much sugar and a pinch of salt in one glass of clean water. (one glass is about 1/3 litre)

ခွက်နှင့်လီတာဗူးမရှိပါက သန့်သောရေတဖန်ခွက်တွင်သကြားတဆုပ်နှင့်ဆားတစ်ဝက်၊ ပြီးဖျော်ရန်။ (ရေတဖန်ခွက်သည် 1/3 လီတာနှင့်ညီမျှသည်။)

သတိပြုရန်
CAUTION!

Making ORS special drink with too much salt can be harmful. So before adding the sugar, **TASTE IT TO BE SURE IT IS NO SALTIER THAN TEARS!!!**

အထူးဖျော်ရည်ဖျော်ရာ၌ဆားများလွန်းပါကအန္တရာယ်ဖြစ်စေနိုင်သည်။

သကြားမထည့်မီဖျော်ရည်သည်မျက်ရည်ထက်မင်ကြောင်းသေခြာစေရန်မြည်းစမ်းကြည့်ပါ။

According to UNICEF, diarrhoea diseases claim the lives of around two million children each year - 5,000 per day, and cause countless more to fall ill. Children already suffering from poor diet and the ravages of other diseases are the first to get sick and die from water and sanitation-related diseases such as diarrhoea, cholera and typhoid.

NEW YORK, 19 March 2004



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5. How will you assess a client who has diarrhoea?

The health worker should **ask**, **look**, **feel** for signs of dehydration, and **check** for problems other than dehydration.

- **Ask** the following questions:

- How many liquid stools per day has the client been passing?
How long has the client had diarrhoea?
Is there blood (more than 1 or 2 streaks) in the faeces?
- Has the client been vomiting?
If so, has the client vomited more than a small amount?
How frequently has the client vomited?
- Is the client able to drink?
If so, is the client thirstier than usual?
- Has the client passed urine in the last 6 hours?
If so, is it a normal amount or a small amount?
Is it darker than usual?

- **Look** for the following conditions:

- What is the client 's general condition?
- Is the client
 - (a) well and alert?
 - (b) unwell, sleepy, or irritable?
 - (c) very sleepy, floppy, or unconscious?
 - (d) having fits?
 - (e) severely under-nourished (wasting or thinness)?
- Does the client have tears when he or she cries?
- Are the client's eyes normal, sunken, or very dry and sunken?
- Are the client's mouth and tongue wet, dry, or very dry?
- Is the client's breathing normal, faster than normal, or very fast and deep?

- **Feel** for the signs:

- When the skin is pinched, does it go back quickly, slowly, or very slowly (longer than 2 seconds)? In a baby, you should pinch the skin of the abdomen or thigh. (Remember that pinching may give misleading information if a child is either undernourished or obese, and also for very old clients who have lost skin elasticity)
 - (a) In a severely undernourished child, the skin may go back slowly, even if the child is not dehydrated.
 - (b) In an obese child, the skin may go back quickly even if he or she is dehydrated.
 - (c) In a very old person with loss of elasticity, skin may not go back at all times.
- Can the pulse be felt?
If so, is it normal, faster than normal, very fast, or weak?
- Is fontanelle (the soft spot on top of the head of infants) normal, sunken, or very sunken (usually children under 12 months old)?



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- **Check** body weight and temperature

Body weight

- If a scale is available, carefully take the weight of the client lightly clothed. Compare the client's present weight with the last recorded weight. Loss of fluid causes loss of weight. However, it is more useful to rely on clinical signs than on measuring weight loss to make a judgement about the dehydration.

Temperature

- Does the client have a fever (a temperature of more than 38.5 C)? Rectal temperature should be taken if the health worker is used to that procedure. Otherwise, the axillary (armpit) temperature should be taken.

Assessment for dehydration

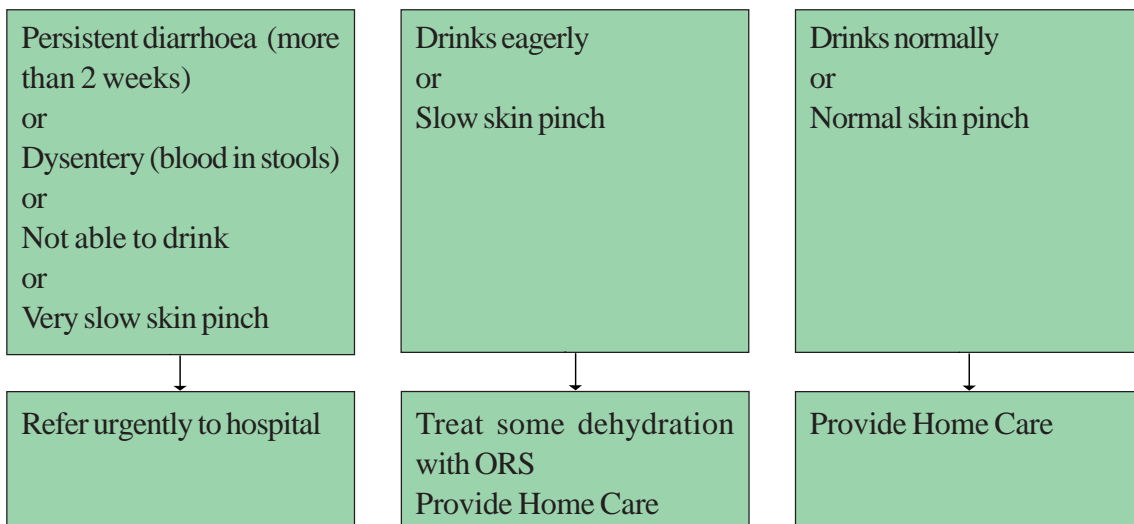
1. ASK ABOUT DIARRHOEA VOMITING THIRST URINE	less than 4 liquid stools/ day None or small amount Normal Normal	4 to 10 liquid stools/ day Some Greater than normal A small amount and dark	More than 10 liquid stools/day Very frequent Unable to drink No urine for 6 hours
2. LOOK AT CONDITION TEARS EYES MOUTH and TONGUE BREATHING	Well alert Present Normal Wet Normal	Unwell, sleepy or irritable Absent Sunken Dry Faster than normal	Very sleepy, unconscious, floppy or having fits Absent Very dry and sunken Very dry Very fast and deep
3. FEEL SKIN PULSE FONTANELLE (for infant)	A pinch goes back quickly Normal Normal	A pinch goes back slowly Faster than normal Sunken	A pinch goes back very slowly, very fast, weak or you cannot feel it Very sunken
4. TAKE TEMPERATURE			
5. WEIGH IF POSSIBLE	Loss of less than 25 grams for each kg. of weight	Loss of 25 - 100 grams for each kg. of weight	Loss of more than 100 grams for each kg. of weight.
6. DECIDE	The client has no signs of dehydration	If the client has 2 or more of these signs, he has some dehydration	If the patient has 2 or more of these danger signs, he has severe dehydration

OTHER PROBLEMS

- *DIARRHOEA LONGER THAN 14 DAYS DURATION, BLOOD IN THE STOOLS AND SEVERE MALNUTRITION SHOULD BE REFERRED TO PHYSICIAN.*
- *FEVER 38.5 C (OR 101° F) OR GREATER: TEACH THE MOTHER HOW TO COOL THE CHILD AND LOOK FOR AND TREAT OTHER CAUSES (FOR EXAMPLE, PNEUMONIA, MALARIA).*



TREATMENT INSTRUCTIONS FOR DIARRHOEA



CARE FOR CHILDREN UNDER 5 YEARS OF AGE

DETERMINE THE AMOUNT OF ORS FOR TREATMENT OF DEHYDRATION AND HOW MUCH ORS TO GIVE DURING THE FIRST 4 HOURS

ORS	AGE OF CHILD			
	Up to 4 months	4 - 12 months	12 months up to 2 yrs	2yrs. up to 5 years
in ml	200-400	400-700	700-900	900-1400
in cups	2 cups	3-4 cups	5-6 cups	6-8 cups

ADVISE THE MOTHER

- If the child wants more ORS than the amount shown in the table, give more.
- For infants under 6 months who are not breast-fed, also give them 100-200 ml plain clean water in addition to ORS during the first 4 hours.

=> SHOW THE MOTHER HOW TO GIVE ORS SOLUTION

- Give frequent small sips from a cup. For small infants, tell the mother to give one teaspoon every minute.
- If the child vomits, wait for 10 minutes. Then continue giving ORS, but more slowly.
- Continue breast-feeding whenever the child wants.

=> AFTER 4 HOURS

- Reassess the child
- Begin feeding the child

HOME CARE

TELL THE MOTHER

1. Give extra fluids (as much as the child can take) such as: ORS, milk, yoghurt drink, rice, water vegetable soup, fruit juice, plain clean water (or other locally available fluids e.g. boiled rice)
2. Breast-feed frequently
3. Show the mother how much fluid to give after each stool in addition to the usual fluid intake:

Up to 2 years

- half cup. Give more if the child wants more.

2 years or more

- full cup. Give more if the child wants more.

4. Continue feeding
5. When to return. Tell the mother to return to the health worker if:
 - the child is not able to drink or breast-feed;
 - the child becomes sicker;
 - there is blood in the stool;
 - the child is drinking poorly.

Source:

1. *The Treatment and Prevention of Acute Diarrhoea, Practical Guidelines, 2nd edition, WHO, Geneva.*
2. *Management of Sick Children Under Five Years Age in Flood Affected Areas, WHO, SEARO.*



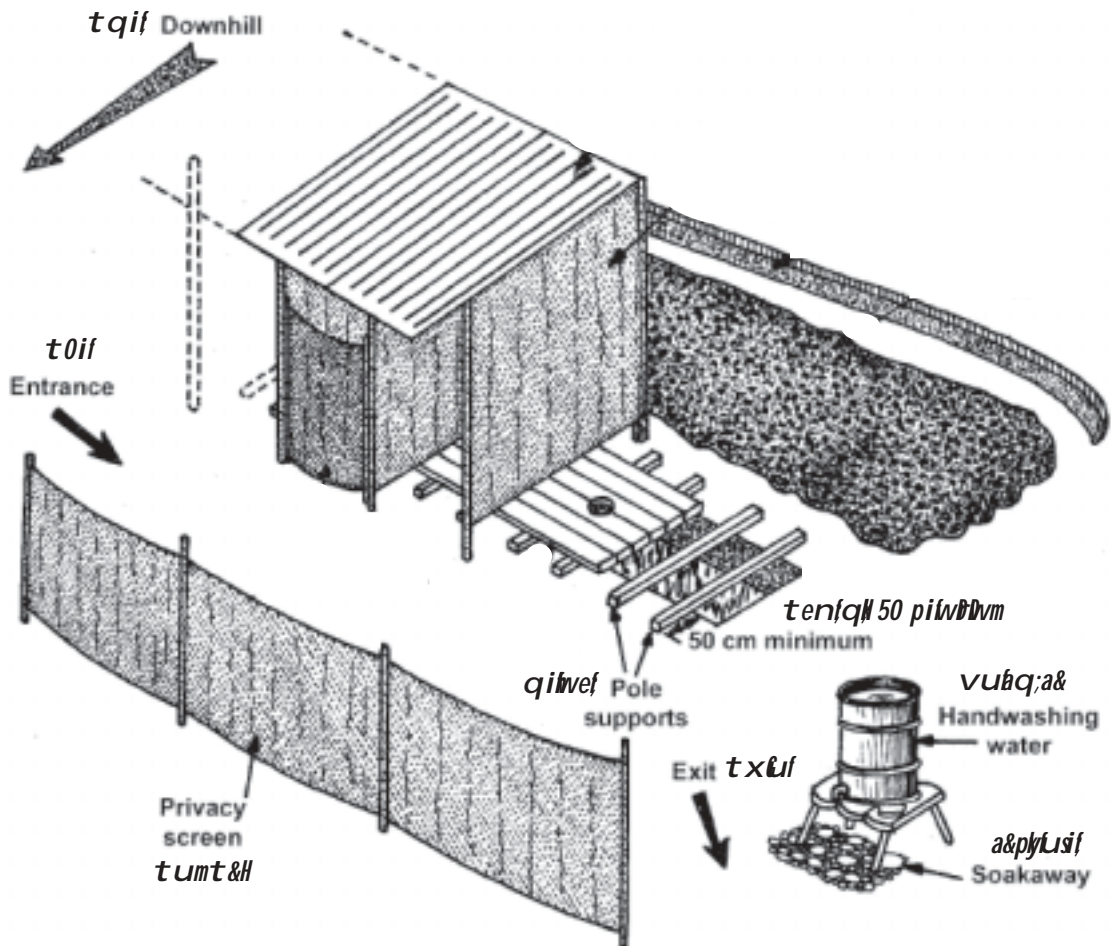
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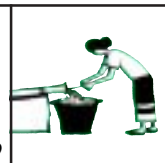


eu&faom ajrmi f t t b o m - Deep trench latrine

(r&if - Source: WHO)

Appropriate Disposal of Excreta

Elisabeth Emerson, WHO



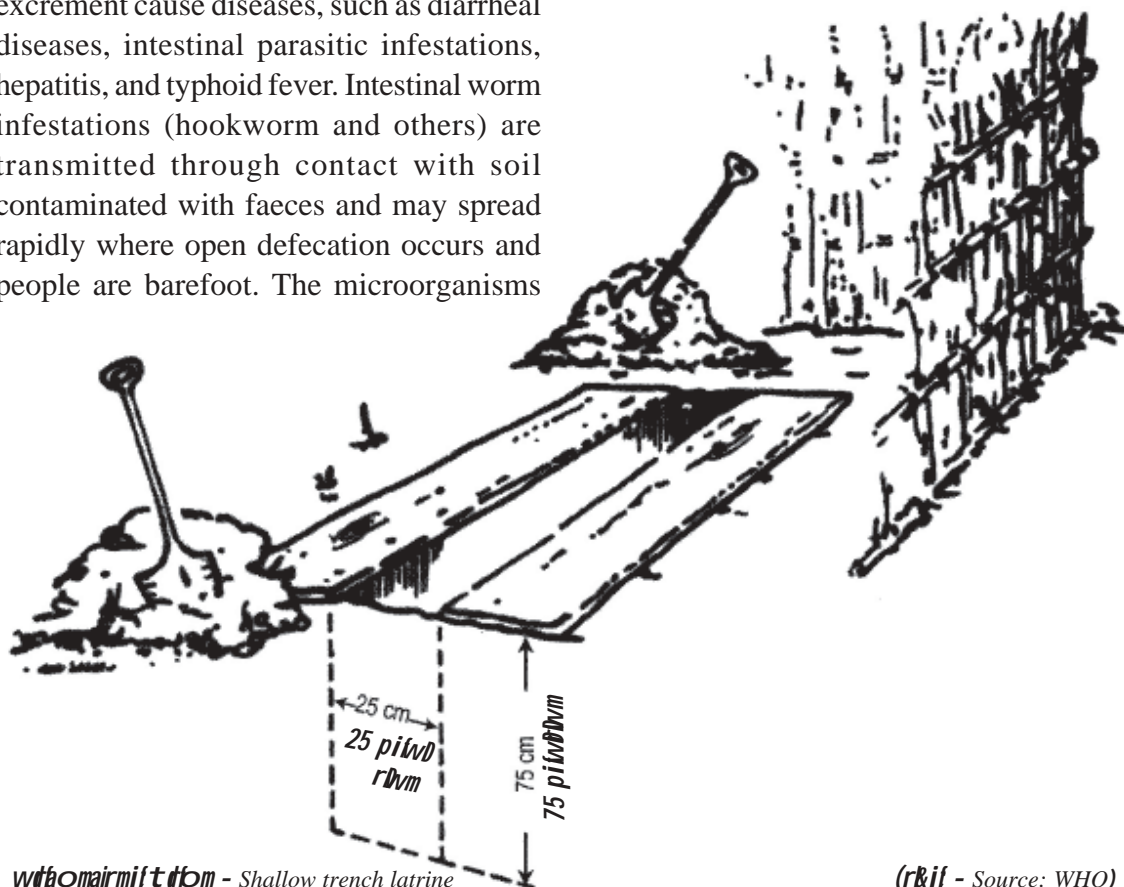
Human excreta waste is a source of infection. Safe removal and disposal of human excreta is an important part of environmental sanitation. This article highlights the different kinds of latrines for disposal of excreta in varying situations.

Improper disposal of excreta contaminates soil and water sources. It can serve as a breeding ground for certain species of flies and mosquitoes, giving them the opportunity to lay their eggs and multiply or to feed and transmit the infection. It also attracts domestic animals and rodents, who carry faecal matter on them and with it, potential diseases. Furthermore, this situation usually creates unsightly areas and disagreeable odors.

Bacteria, parasites, and worms that live in excrement cause diseases, such as diarrheal diseases, intestinal parasitic infestations, hepatitis, and typhoid fever. Intestinal worm infestations (hookworm and others) are transmitted through contact with soil contaminated with faeces and may spread rapidly where open defecation occurs and people are barefoot. The microorganisms

contained in human faeces may enter the body through contaminated food, water, eating and cooking utensils and by contact with contaminated objects. Use of sanitation services protects health, prevents disease, and protects surface and ground water.

The goal of sanitary excreta disposal is to isolate excrement, so the infectious agents in it cannot reach a new host. The method selected for a given area or region will depend on many





factors, including local geology (condition of soil) and hydrogeology (condition of water and soil), the communities' culture and preferences, the materials available locally, and the cost.

Building Latrines

If there are no sanitation services, latrines should be built. Three options, appropriate for different situations, are described below:

Shallow Trench Latrine

A temporary solution for disposal of excrement is a shallow trench latrine. These trenches should never be used for more than a week before they are covered and replaced. A community may decide to use a communal trench latrine. A shallow latrine of 3-5 meters is needed for every 100 people. If this is done, a stock of shovels needs to be available. After each visit, the user should shovel into the trench sufficient soil to cover the excreta. Boards can be placed on the edge of the trench to provide stable footing and prevent the sides from caving in. When the trench is filled to within 30 centimeters of the top, it should be completely filled with soil, compacted, marked for future identification, and a new trench should be dug. (See illustration of shallow trench latrine.)

Deep Trench Latrine

For longer-term needs, a deep trench latrine may be the appropriate choice. A deep trench



r&f - Source: WEAVE

latrine can last for one to three months. It is deeper, longer and wider than a shallow latrine and can be constructed using wood planks, plastic squatting plates, plastic sheeting or metal sheets. Soil is piled up and used to cover excrement, the same as with the shallow trench latrine. Lime can be used to reduce the development of methane gas and odors. (See illustration of deep trench latrine - page 34)

Simple Pit Latrine

Individual simple pit latrines, hand-dug or drilled, are the appropriate longer term choice. Family latrines are normally preferred, as they are usually more than public facilities and there are long-term benefits as far as maintenance. If given the proper advice and tools, a family can dig its own latrine. Simple screening can be used to provide privacy and give protection from the weather. Tight-fitting lids on the squatting holes are important for the control of

Excreta control and small children

Children's faeces are generally more infectious than those of adults, and many children are unable to control their defecation, so preventing indiscriminate defecation by small children should be a priority. Parents should be encouraged to clean up and dispose of children's faeces rapidly and hygienically. Shovels, small spades or home-made digging tools made from wood should be available for parents to enable them to bury their children's excrement.

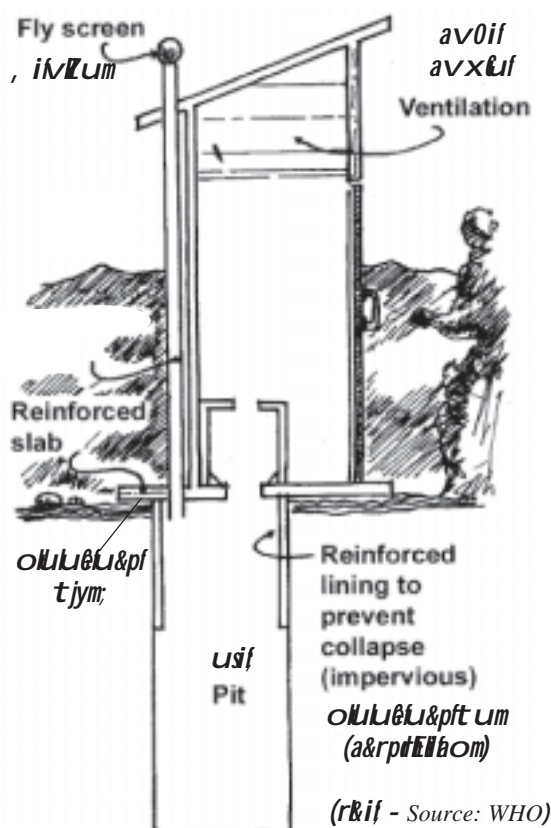


flies, mosquitoes and odors. The latrine slab can be made of logs, plastic, concrete or a combination of these.

The pit latrine should normally last about one year. In areas of unstable soil, it might be necessary to line the pit to prevent collapse. Linings can be made from bamboo, concrete or old oil drums. Pit linings should not be watertight below 50 centimeters deep. (See illustration of simple pit latrine.)

Points to Remember

- a. Before installing a latrine, the soil at the site must be evaluated along with topographical (regional) conditions, user access, and the presence of surface and ground water in the surrounding area.
- b. If the land is not appropriate for latrine construction (rocky soil or high water table), above ground latrines with removable tanks can be built. The excreta must be transported to a pit located on appropriate ground, for immediate burial.
- c. Community education should include information and instructions on:
 - Using the sanitation services only for defecating or urinating (do not store tools or other items in the latrine).
 - Washing their hands with soap and water after urinating or defecating.



- Keeping the floor, walls, and area surrounding the latrine clean.
- Not defecating or urinating outdoors in the area around the sanitation services or near bodies of water, since this encourages the proliferation of flies and larvae and water contamination through water runoff.

Resource material from: Environmental Health in Emergencies and Disasters, WHO
Natural Disasters: Protecting the Public's Health
Guide to Sanitation in Shelters and Camps, WHO

Sanitation in Tham Hin Camp (Latrines)

Every family has its own flush latrine, usually at home. They made it by themselves with the materials provided by MSF: plastic sheeting and bamboo for roof and walls, ceramic bowl, and half a bag of cement for the slab. When the latrine is full, they dig a new pit and are provided with a new bowl and cement.

Source: MSF



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Disposal of Solid Waste, including Medical Waste

Elisabeth Emerson, WHO



Health personnel and social workers need to have a basic knowledge of solid waste disposal because improper disposal of wastes can lead to serious health problems.

This article illustrates two simple disposals of waste; burying and burning.

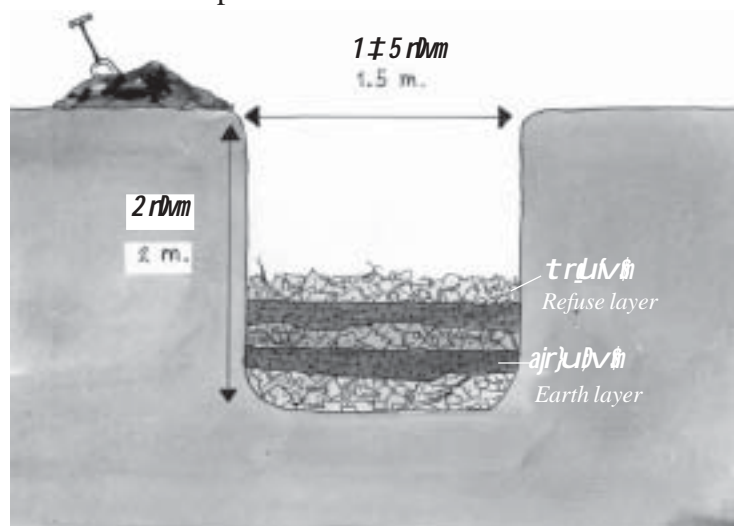
Solid waste may be refuse, manure, or animal cadavers. There is a correlation between improper solid waste disposal and the incidence of vector-borne diseases. As a result, arrangements must be made to collect, store, and dispose of refuse and manure. Burying or burning organic solid waste is recommended, and open dumping should be avoided. Great care must be taken in selection of a disposal site. Once an area begins to be used as a disposal site, it can become a permanent dumping site.

If there is no regular waste collection and final disposal service, waste should be buried or burned. Waste disposal pits measuring 1.5 meters

wide, 1.5 meters long, and 2 meters deep will serve a population of 200 for ten days. At the end of each day, cover the refuse with 15 cm of dirt and pack it down. The maximum size of a pit should be 3 meters by 3 meters. Before the pit is full, cover it with a layer of packed dirt 40 cm thick so that it is level with the ground. Then dig a new pit.

Medical Waste and hazardous waste need to be handled separately from common wastes. Recommendations for appropriate management of these wastes are:

- Separate hazardous (toxic and dangerous), and sharp/medical waste from common waste. If possible, store the hazardous and medical/sharp waste in strong containers with plastic covers. Dispose the common waste in a pit as described above.



Refuse pit

- Hazardous waste can be destroyed in a home-made incinerator that can be built using a fuel drum with a ventilation hole on the bottom. Inside there must be a

grill to hold the waste. The ashes can be disposed of in the pit for common waste. (See illustration of incinerator.)

- Sharp waste (needles and glass) can be disposed of in a hole or pit with 1 m³ capacity, covered with a heavy concrete slab. A tube 2 inches in diameter, running through the slab and extending roughly



1.5 meters above it, can be used for depositing needles and surgical blades without syringes or venoclysis (intravenous injection application) tubes.

- Dead animals and excrement from domestic animals must be buried immediately, since they can be a source of contamination.

Resource material from

- *Environmental Health in Emergencies and Disasters*, WHO.
- *Natural Disasters: Protecting the Public's Health*.
- *Guide to Sanitation in Shelters and Camps*, WHO.

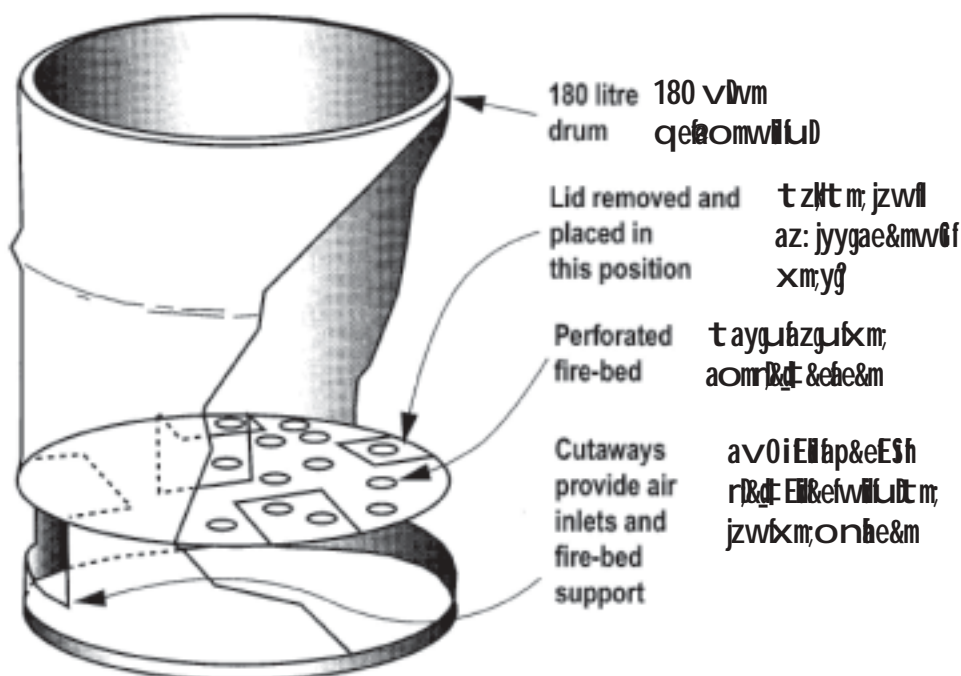


Figure 1 - Incinerator made from oil drum

Source: WHO

Sanitation in Tham Hin Camp (Refuse)

MSF (Medecins Sans Frontieres) as a team manages 6 garbage areas in Tham Hin Temporary shelter. These areas are located on the edge of the camp. The community dispose of their own garbage. At home they first sort out the dry one (plastic, bamboo, paper...) from the wet one (kitchen leftovers, cooking water, rice...) in two different containers (plastic bag or oil tin or bucket). They bring them to the garbage area and empty them at the appropriate place: the wet garbage in the wet pit (a 9m³ hole covered with a bamboo and plastic sheeting cover), and the dry garbage at an open burning site. Every garbage area is managed by one sanitation worker. He helps people to carry and throw their garbage in the right place; he cleans and keeps the pit cover closed; he takes care of the fire. He also maintains his work area and the surroundings. MSF hires community members to clean regularly in the camp.

Source: MSF



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An illustration of two mice. The mouse on the left is brown with darker brown spots and a long, thin tail. The mouse on the right is tan with darker tan spots and a long, thin tail. They are both facing each other in a slightly confrontational or curious pose.

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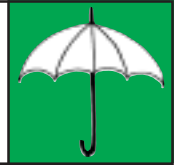
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This article is an introduction to the biology of different rodents and the control methods, which will help the medics and social workers to combat rodent problems in their environment.

Rodents make up more than 42 % of the known mammalian species and they play an important role as reservoirs of disease-causing agents (pathogens) in the transmission of diseases to other mammals around them.

Methods of disease transmission by rodents

Disease causing agents are transmitted by:

- ectoparasite (flea) of the rodent which can transmit plague and typhus
- rodent excreta which can transmit salmonella and leptospirosis.
- rat bite fever

Biology of the rat and the mouse

Domestic rodents can be identified most



commonly as three species: the black rat, the brown rat and the mouse.

The black rat

The adult measures about 40 centimeters (about 16 inches) and weighs about 250g. The mouth (muzzle) is pointed, the ears round and protruding from the fur, and eyes protuberant. The appearance may be dark gray or brown.

The nest is generally built on the ground, in vegetation or in trees (and exceptionally in a burrow or sewer).

In houses the nests are generally built under the roof and the high-flying areas.

The diet is very varied (vegetable and animals). Sexual maturity is reached at two months.

The brown rat (or sewer rat)

The colour is generally brown. It is bigger than the black rat and may exceed 400g. Its mouth is rounded and the eyes are smaller than those of the black rat.

Nests are built in burrows with an entrance diameter of about 8 centimeters.

The diet is less varied than that of the black rat. The brown rat prefers refuse and human waste.

The domestic mouse

This is a well know universal species. Its biology is similar to that



of the rats. The mouse can survive with the water enclosed in food, whereas the rat needs free water.

Its maximum weight is 20g and its length 20 centimeters. For two animals of the same size, the head and the feet are larger than those of the young rat.

Nests are built any place where there is an accumulation of material for making the small shelters, which the mouse needs. Therefore, making control difficult.

Control Methods

1. Environmental Hygiene

Like many other vectors, the environment should be created so that it is unsuitable for rodents to live. The stored food should be kept beyond the reach of rats. It is essential to dispose of refuse in a systematic way in order to deny access to the rat. Elimination of likely sites to reduce reproduction should be carried out.

2. Protection from Rodents

The aim of protection from rodents is to prevent access by rodents to important or vulnerable areas (food stores, water, liquids, etc). Block or protect all openings greater than 6mm with cement or metal netting (1mm wire mesh less than 6mm diameter). Place discs on cables (rat proof). Paint a smooth band on walls at 1 meter from the ground to prevent passage on rough vertical surfaces. Fix aluminum or galvanized sheet (1mm) at the bottom of doors and on the skirtings.

Repair all broken packages. Leave a passage (1mm) between walls or pillars and stacks, to allow inspection. Stack bags with care, leaving sufficient space between the top of the stack and the roof. Clean the storage area daily and never let a stack remain intact for more than a month. Inspect the storage area at least once a week for insects, signs of

damage, presence of rodents and throw refuse away regularly.

3. Trapping

This method never achieves complete eradication by itself. Trapping can be used to get rid of the last few survivors left from a chemical control campaign or individuals of an isolated and small infestation.

Spring traps are the only efficient models. The key points to follow are to use many traps. They should be placed across the rodent's path and traps should be left unset for several days so that the rats become used to them (except for mouse traps). A well-placed trap does not need bait.

4. Poisoning

Single-dose poisons and multi-dose poisons can be used for rat poisoning.

Single-dose poisons

These are only effective if the rat ingests a lethal dose at the first feed, otherwise the rat will not go back to the bait again.

These poisons are extremely toxic and, in addition, they require special skills and experience in rodent control if they are to be effective.

Multi-dose poisons

These are poisons with a cumulative effect used at low doses, which have two advantages:

- The slowness of their effect allows the animal to absorb a lethal dose before the first effects are felt.
- Their mode of action makes them less dangerous to man and other domestic animals, and there is an effective antidote.

Important to label the box with the safety message: POISON

Source: *MSF Public Health Technician manual 1994 - 1st edition*



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AMI Water and Sanitation Activities in Dala



Health Messenger Team in Collaboration with AMI-Myanmar

This article highlights the importance of community participation and provides technical tips to create successful community dynamics.

Since 2002, Aide Medicale International has been running a water and sanitation Programme in Dala, one of Yangon's poorest townships. Based on community participation, the programme provides quality water to 30 schools and more than 20,000 people.

Across the river from Yangon, Dala Township is home to 100,000 people, mostly Burmese workers who commute every day to work in the city. Often living under extreme poverty, they suffered from poor sanitation and many water-related diseases. Before AMI started its programs, getting water was achieved either by buying government water from mobile vendors or by helping oneself in the murky waters of the many ponds in the township. Unprotected ponds often contaminated by animals and lack of hygiene awareness resulted in high rates of dysentery, diarrhoea and skin diseases.

The Programme

Focussing on the most vulnerable population, Aide Medicale Internationale provides quality water and health education to 30 schools as well to the most affected areas of Dala. The programme provides technical assistance and education to help the population build and maintain:

- Rain collectors
- Sanitary latrines:
- Tube wells with pumps:
- Protected ponds:

Community Participation

Raising the awareness on safe water and engaging in a community participation approach are crucial to ensuring a long-term reduction of water-related diseases in Dala Township. But mobilizing people, not used to working together, can be a challenging task.

The System

The water and sanitation programme in Dala Township provides technical assistance and health education to groups of 10 to 12 families who are committed to taking part in the construction and management of latrines, rain collectors and pumps. They are called : Water User Group. There are hundreds of WUGs involved in the Dala sanitation programme. Each group is responsible for the construction, maintenance and management of an "hygiene kit": combining latrines, a pump and a rain collector. The WUG select a leader who will be in charge of all aspects of the project: managing the community financial contribution (money paid by the family to use the water and which creates a reserve fund to maintain or fix the water facilities) and ensuring that the facilities are clean and operational.

Raising Community Participation in Water Sanitation Programmes

Example of strategies to raise community



participation: the program follows 14 steps:

Step 1: Forming a group:

The community's background: The group should involve young and old, men and women, poor and rich people. To work together, the group needs a relaxed atmosphere. Sessions will, therefore, often begin with fun activities to break the ice. Then AMI activities in Dala are briefly presented.

Step 2: Identification of the community needs in sanitation:

These exercises aim to build team spirit and mutual understanding of everyone's needs. For example a group is divided into several sub-groups of 5 people. Each group is given several cards with drawings related to water and sanitation issues and then invited to tell a story about their community's water & sanitation problems, using these cards. The stories will stimulate discussions on the issues raised through the game.

The community's health problem: The aim of the following exercise is to help the community identify health problems linked to water and sanitation and think about practical solutions.

Using drawings to illustrate different health problems, for example, diarrhoea, stomachache... the group is encouraged to describe why the person is sick and what can be done to prevent the illness.

Step 3: Problem analysis

The group is asked to map the respective community's roads, schools and all facilities. Then the group is divided into two groups. One represent the host; the other one the visitor. The first group will have to describe and introduce its community and in particular its water sanitation facilities to the second group. The purpose of this "tour" is to take a perspective on the community facilities.

Step 4: Identification of the need for water:

The aim is to show the different needs of water according to the seasons. Using a calendar, people are encouraged to forecast the amount of money they will spend on water for each season.

Step 5: Working together...

The spider games illustrate the need to work together. The group hold hands in a circle. Each of them hold a string to which is tied a candle. The leader is trying to get the group to put the candle in the bottle by guiding the other members.



yilulupmerf - The spider games



&xm;upm;enf - The train game

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v l y f e f w c p d o y & y y d t c s e f r s w i r f w i r _
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t q i f 14 ? t p n f t a o ; r m ; w u h & m u j c i f ?

t p n f t a o ; r m ; w u h & m u e f t a & ; u b a u m i f u l l
u p m ; e n f r m ; a q a E o c i f e n f r m ; j i l t l y p k t m ; o y g a p ?



Step 6: Unity is strength

A series of discussions help the group to understand the advantages and disadvantages of working in a group.

Step 7: The group dynamic

Discussion on the difficulties of working as a group and the effort that everyone can contribute in order to reach a common objective. The different types of group members are identified: complainers, know-it-alls, quiet members, positive members, traditionalists, bridgebuilders, etc..

Step 8 : The role of leaders

What are the main qualities of a good leader?

Discussion on the role of a leader in maintaining and supporting a group.

The train game: A good leader will be able to guide his blindfolded team by tapping on their shoulders: right shoulder means going to the right and left to turn to the left.

Step 9: What makes a good leader

Discussion on what the groups think of different leaderships: a leader who commands,

a leader who consults, a leader who enables...

Step 10: Choosing the right leader

The group is pushed to identify the kind of leadership they need, and according to all the elements discussed earlier, each person writes the name of the leader they have chosen. The vote is anonymous.

Step 11: The role of treasurers:

One person will be responsible for collecting money from the participants for the use and maintenance of the water facilities. The qualities of a good treasurer are discussed with the group. The person chosen will be trained on keeping basic accountancy.

Step 12: The money collection:

The group will explore what they are ready to pay for the new water facilities and organise the collection of money. The group will decide how much they want to give according to their need and what is the most appropriate way of collection for them: monthly, daily, etc

Step 13: Keeping Records:

Discussions on the importance of clear and regular record keeping for each activity.

Step 14: Attending meetings

Through games and discussions, the importance of attending meetings is stressed to the group.



Attending meetings

Interview with Water Users

Health Messenger Team in Collaboration with AMI-Myanmar



Ko Lu Lu (Watsan Educator)

How long have you been working with AMI? What are your main responsibilities?

I have been working with AMI for two years. My main responsibilities are forming user groups for every 10 households and maintenance training of the caretakers of the water facilities.

What has been the main constraint in your activities?

Time limitation has been a critical constraint. It is a very difficult task to adapt our timing to the communities' timing.

What changes due to the project have you observed?

The changes in project areas have been quite evident. There were barely any household latrines in the project area. Most of the latrines before the project were unsanitary. I found the smell of the wards to be very bad. Now they have family latrines. The community used to get

domestic water from the makeshift small ponds in front of their houses, of which the water quality was very bad. Now I can see that they are using water from the shallow tube well through assistance from AMI. A few people are still using the turbid water for domestic usage. But, comparatively very few. Before the project, the average family had to buy drinking water, which cost 150 – 300 kyats. Now the family expenditures have been significantly reduced.

U Nyein Maung (User)

What is your job?

I work in pearls and fisheries.

How long have you been staying in Dala?

About seven years.

What was the water situation like before the project?

It was very difficult. A bucket of water is 20 kyats. Even if we are willing to spend for that, there are no sellers sometimes. And we had to buy and drink the water from shallow tube wells, whose taste is totally unsatisfactory. The water sellers brought the drinking water from Yangon.

Were there any health problems due to water? And has there been any change?

Diarrhoea occurred sometimes. Even our family suffered two times. It was quite costly to go to the clinic. This year I haven't heard of any diarrhoea cases happening in our ward. The project well has reduced the health cost.



Sources of water

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6 Eðfölmur

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How is the RWC(rainwater collector) and shallow tube well working?

We hope we can depend on the RWC until the end of March for our drinking water. The water from the shallow tube well is not clean enough to drink. But if we keep it overnight, we can use it for domestic purposes.

Daw Thaung Thaung Aye (User)

What is your job?

I look after my family. My husband is a labourer at the jetty.

How long have you been staying in Dala?

About six years.

How did you get your water before the project?

We had to buy drinking water from the water sellers and use water from the shallow tube wells for the home.

What changes due to AMI project have you observed?

The cost due to water is greatly reduced. We are very happy that the water we are drinking and using now is good. Now, we are drinking the water from RWC and using the

water from shallow tube well with an iron removal system, which was constructed by AMI.

U Kan Min (WatSan Officer, AMI)

What are your responsibilities in AMI Dala Project?

Supervision of all the engineers, preparation of technical designs and overall supervision

What was the situation in Dala like before the project?

Before the project, I had been to Dala a couple of times on my trips to Twantay. In 2002, I arrived there on duty. I observed that there were many households without a water source. People had to depend solely on Yangon water. The water from Kyan Sit Tha Ward was very turbid. There were no latrines. Domestic water was also scarce. People looked quite downhearted. The majority of the people living in Dala are hand-to-mouth workers. They had to spend about 20% of their income for water. For those who couldn't afford to buy it, they or their children had to fetch water. The water sources were quite far, so they had to spend a lot of time on fetching water. What I mean is that people had to spend a lot of time and money to get water and the water they got was not clean.

What activities is AMI doing in Dala?

It started with water, sanitation and health education activities. AMI has provided the Watsan facilities. This year, assistance is being provided to 14 primary schools, 6 middle/high schools, and households from four wards. The main projects AMI is doing in Dala is



Clean water means healthy



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water and sanitation, mother and child healthcare, HIV/STD prevention and health education at schools.

What changes due to the project have you observed?

Tangible changes are the physical facilities. But there are some intangible changes. People's happiness. People can spend more time and money on other things rather than fetch water. AMI activities have reduced the livelihood burden of the inhabitants. For example, they get some earnings for baking the bricks, hiring the trailer jeep, etc. Such things indirectly affect 4-500 families. People have become calmer than before.

Daw Hnin Hnin Kyaw (Education Officer, AMI)

What are your responsibilities in this project?

Supervision of five community educators and four school educators, Interaction with communities, departments, township education officers and headteachers.

What was the situation of Dala like before the project?

Dala is a flood-prone area. Most areas of Dala are flooded in the rainy season. But in dry season, they face a water scarcity. People didn't have water as they liked.

They had to spend a lot of money. Some had to fetch water from quite a distant location. The ponds they used were not protected. People suffered from diarrhoea and skin diseases. Children suffered from worm infection.

What activities did AMI do?

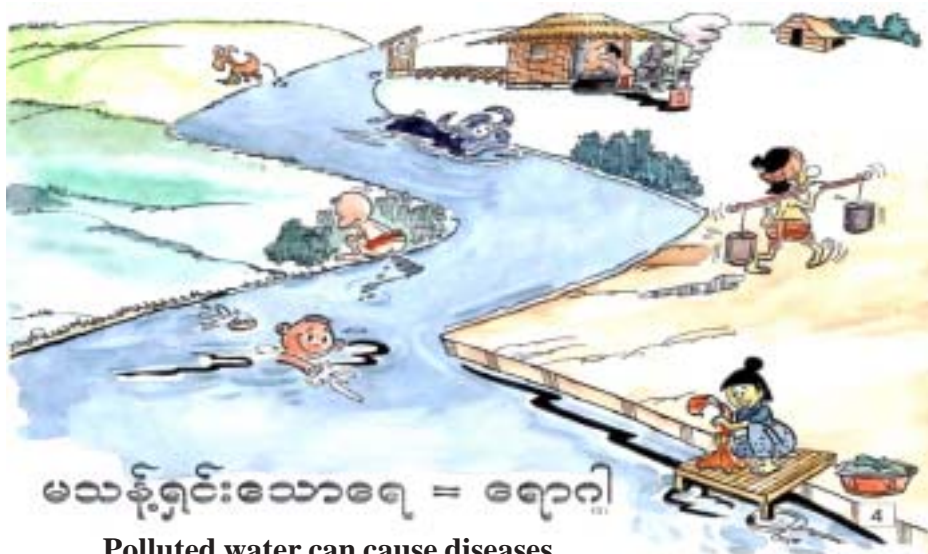
AMI constructed rainwater collectors and hand pumps with a scale of 1 unit per 10 households. Ponds were renovated including installation of fencing and hand pumps.

What constraints have you faced?

In terms of community level, it is a peri-urban setting. The majority are hand-to-mouth daily wage workers. They have survival problems. It is very difficult to compromise the timing of their involvement.

What kind of impact due to the project have you observed?

The distance to fetch water is reduced. There is no need to worry about the drinking water. People can save some money for other uses. There is better personal hygiene due to sufficient domestic water. The township medical officer has mentioned that nobody has been hospitalized for diarrhoea this year.



Polluted water can cause diseases



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Water Disinfection By Sun

Health Messenger Team



Drinking water should not contain any disease germs known to be harmful to humans. It should also be free from bacteria, which is an indication of pollution with human faeces. This article describes a simple method to make drinking water safe for people living with limited resources.

Water disinfection by sunlight is a simple technology used to improve the quality of drinking water. It uses sunlight to destroy germs, which cause waterborne diseases.

This method is ideal for treating small quantities of water. Transparent plastic bottles are filled with contaminated water and exposed to full sunlight for six hours.

Sunlight treats the contaminated water through two mechanisms which cooperate in performing a disinfection process. The first mechanism uses radiation in the form of UV (ultraviolet) rays and the second is increased water temperature. If the water temperature is raised above 50 degrees centigrade, the disinfection process is three times faster.

Key factors of sun disinfection:

- It needs to be exposed to the sun for 6 hours if the sky is bright or up to 50% cloudy.
- It needs to be exposed to the sun for 2 consecutive days if the sky is 100% cloudy.
- If a water temperature of at least 50 degree centigrade is reached, an exposure time of 1 hour is sufficient.
- It requires relatively clear water.
- Various types of transparent plastic materials are good for sun disinfection.
- Ordinary window glass of 2 millimeter thickness is practically opaque to ultraviolet radiation.
- Heavily scratched or old, blind bottles (aging plastic bottles) should not be used.
- Increased water depth reduces sun disinfection (at a water level of 10 centimeters or about 4 inches and moderate turbidity, ultraviolet radiation is reduced to 50%).
- It requires sun radiation and temperature.

Solar Energy Benefits Thousands of Burmese Refugees

Green Empowerment has taught the medics working along Thai-Burmese border how to build, maintain and troubleshoot photovoltaic (electricity generated from sunlight) systems that provide electricity for lighting and medical equipment.

Source: Green Empowerment, Wednesday, April 21, 2004



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DISINFECTION OF WATER BY SUN



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Inactivation of micro-organisms by sun ray
(UV-A-radiation) and thermal treatment.



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(Step 1)
Wash the bottle well the first time you use it.



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(Step 2)
Fill the bottle 3/4 full with water.



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(Step 3)
Shake the bottle for 20 seconds.

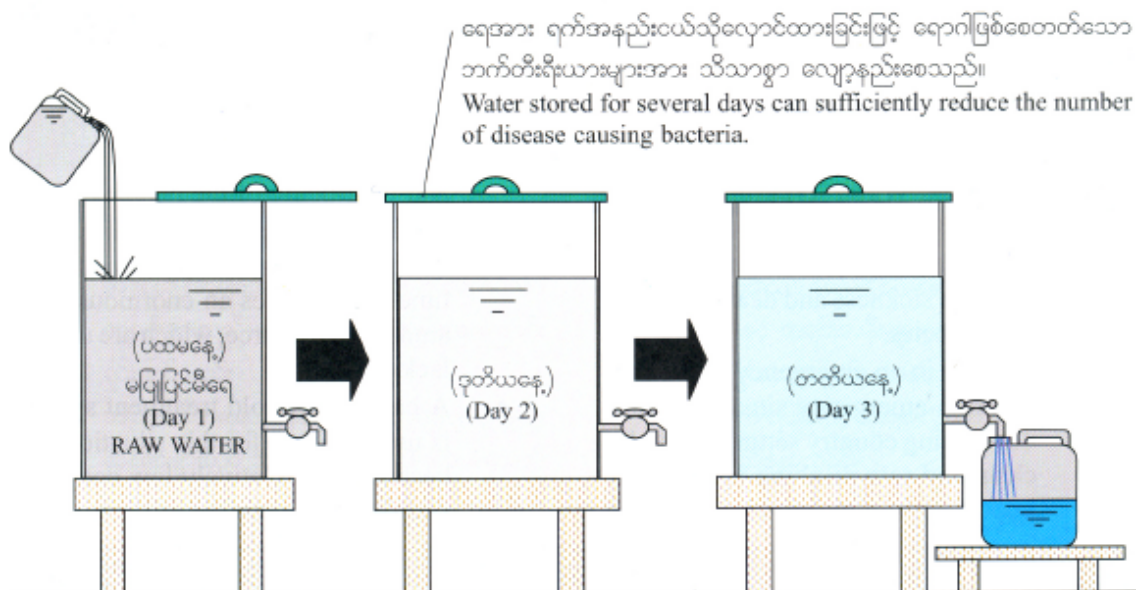


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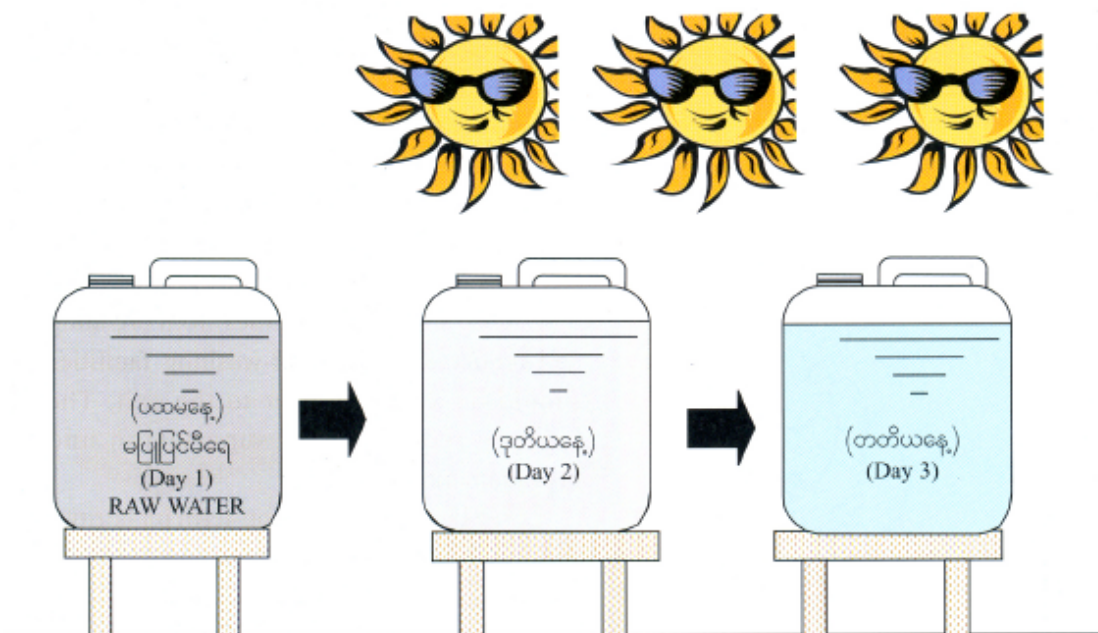
(Step 4)
Now fill the bottle fully and close the lid.



ပုံသုံးပုံးဖြင့် အိမ်သုံးရေ သိုလှောင်ခြင်းစနစ် Three-Bucket Household Water Storage Scheme



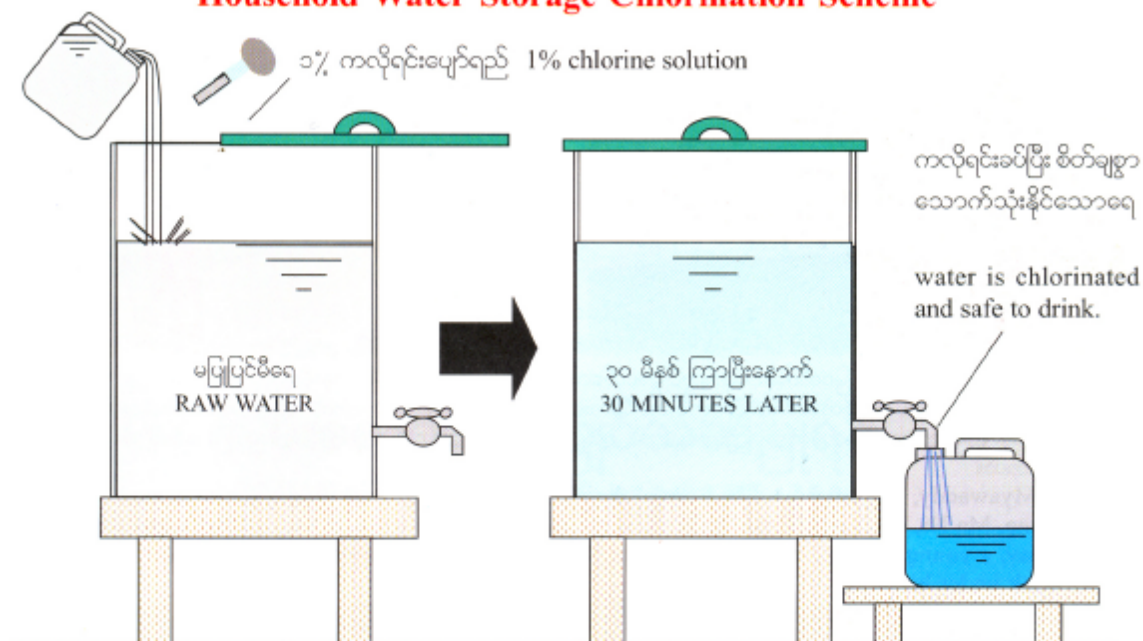
အိမ်သုံးသိုလှောင်ရေနှင့် နေရောင်ခြည်ဖြင့် ပြုပြင်သောစနစ် Household Storage and Ultraviolet Water Treatment Scheme



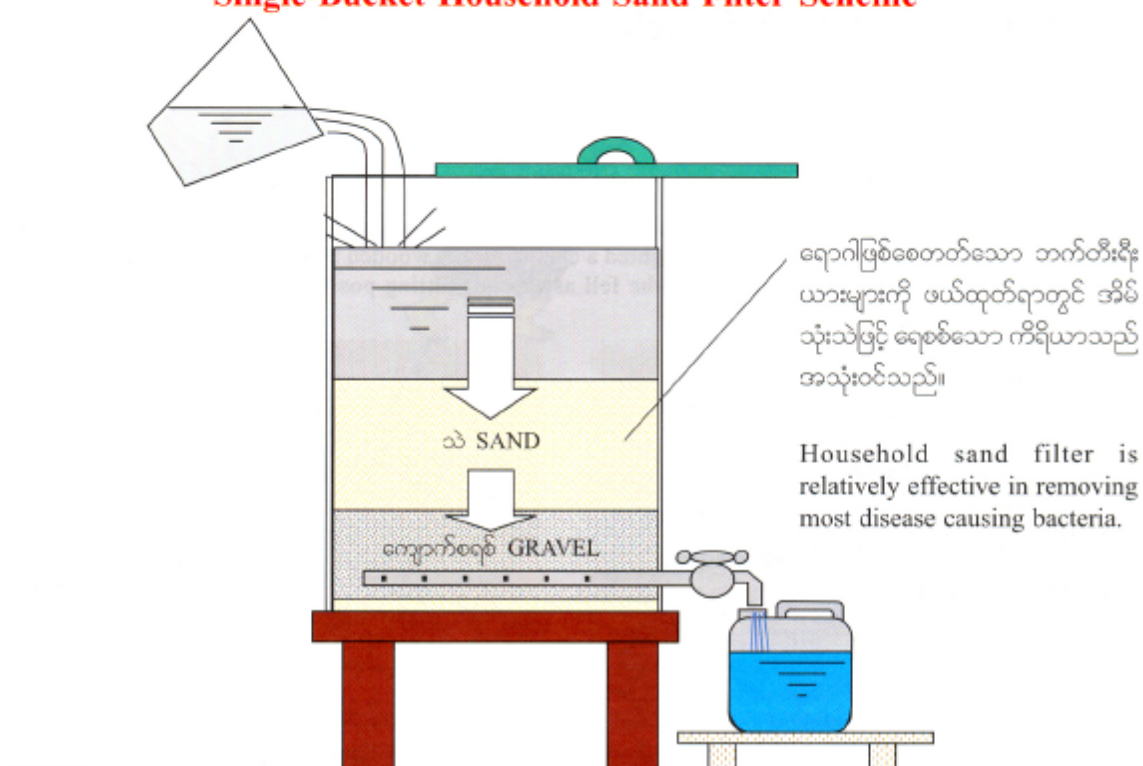
rkif - Source: Quyen Tran



အိမ်သုံးသိုလှောင်ရေနှင့် ကလိုရင်းဆေးခပ်ခြင်းစနစ် Household Water Storage Chlorination Scheme



ပုံးတပုံးအသုံးပြုပြီး အိမ်သုံးရေကို သဲဖြင့် ရေစစ်သောစနစ် Single-Bucket Household Sand Filter Scheme



r&f - Source: Quyen Tran



npfwwh om r i f om;

u e f r m a & ; a p w r m e f t z e s h y g v e m p f w h f w h & ; o m ; o n f



a e m u f v l u h e m u f y w h e h o r i f m ; t m ; t r v l u h e p o f a w m t y l w t y f t w f y r i f o m ; “ 0 ± u k R m ? ”
o n f s u a p h v n f v r f a y m u f a v o n ? t p m j y w f a & j y w f r i f o m ; o n f o p y i l w y i a t m u l w f b o w d
v p l v s o f o n f

x l t c e f t c g w f o p y i f a p m i e w f r i f o n r i f o m ; t m ; j r i a w e o r y p o e m ; p h f j z p h y : v m w , f e w f r i f v l
r i f o m ; u l u h & e f u l f i j y w , f

ew f r i f ? ? e w f v e w e t e u l f i j y & e i j v u h u l x m i a w m r , f (j r i a p - j r i a p o w n f)

r i f o m ; ? ? t v l b l m ; / b l m ; ! w i t z h o v r h i i v l u w m ? r h a n i f u s w , f i j y &

ew f r i f ? ? b m a - u m i l / i q u l f i j y g q e b o m a - u m i h a r h i & o v f [l w y d (i g e u l f x i f a y m u h a p)

r i f o m ; ? ? t v l b l m ; & s i ! a w m u f v i f v u f v l u w m / b , f t & m r s ; j z p b v ?

ew f r i f ? ? (t v l b l m ; / b l m ; ! q e l u s i b u l y g u v m ;) ? i g o n b o p y i f a p m i e w f r i f j z p b n ?
t o i f i f o m ; u l u h & e f u l f i j y c i f j z p b n ?

r i f o m ; ? ? u e f y f o r f o m y g w , f v r f a y m u f e t u e f y a e m u f v l u s m ; u l n f & s r a w e a w m y g q m v l
q m w , f a & v l i w l w , f a u s z i j y k y l c u t s i f o m t u l t n h y ; y a w m d

ew f r i f ? ? u e f y u h y g n ? o h o m f u h & e b i h o m o l [l w f [l w a w m b e l v y g w , f

r i f o m ; ? ? t b , f t a u m i f a - u m i f j z p y p v ?

The Prince of Dirty

Health Messenger Team in Collaboration with Partners



The Prince "Wannakhonmar" was lost in the forest while he was hunting deer with his followers. Because of the lack of food and water the prince fainted under a tree.

At that moment, the spirit guard of the tree saw him and sympathised with him. So he decided to help him by showing his appearance.

Spirit With the power of a spirit, I will raise my index finger to show my appearance.
Appearanceappearance.

Prince Oh! Gosh! It is as black as night. It seems like black clouds are falling down.

Spirit Why! Why does it becomes dark when I say "appearance?"
OK. I will disappear.

Prince Oh my Gosh! It is so bright and fluorescentWhat is it?

Spirit Oh Gosh! It is just the opposite now. I am the spirit guard of this tree.
I am showing my appearance to help you.

Prince I am so glad. I have lost my way and cannot find my followers. Now I am hungry and thirsty. Please help me at once.

Spirit I will help you, but I have to know whether you are the one I should help or not.

Prince Why?

Spirit For the moment, I will give you some fruits.
Here is a banana, a guava and a mango. Eat them!

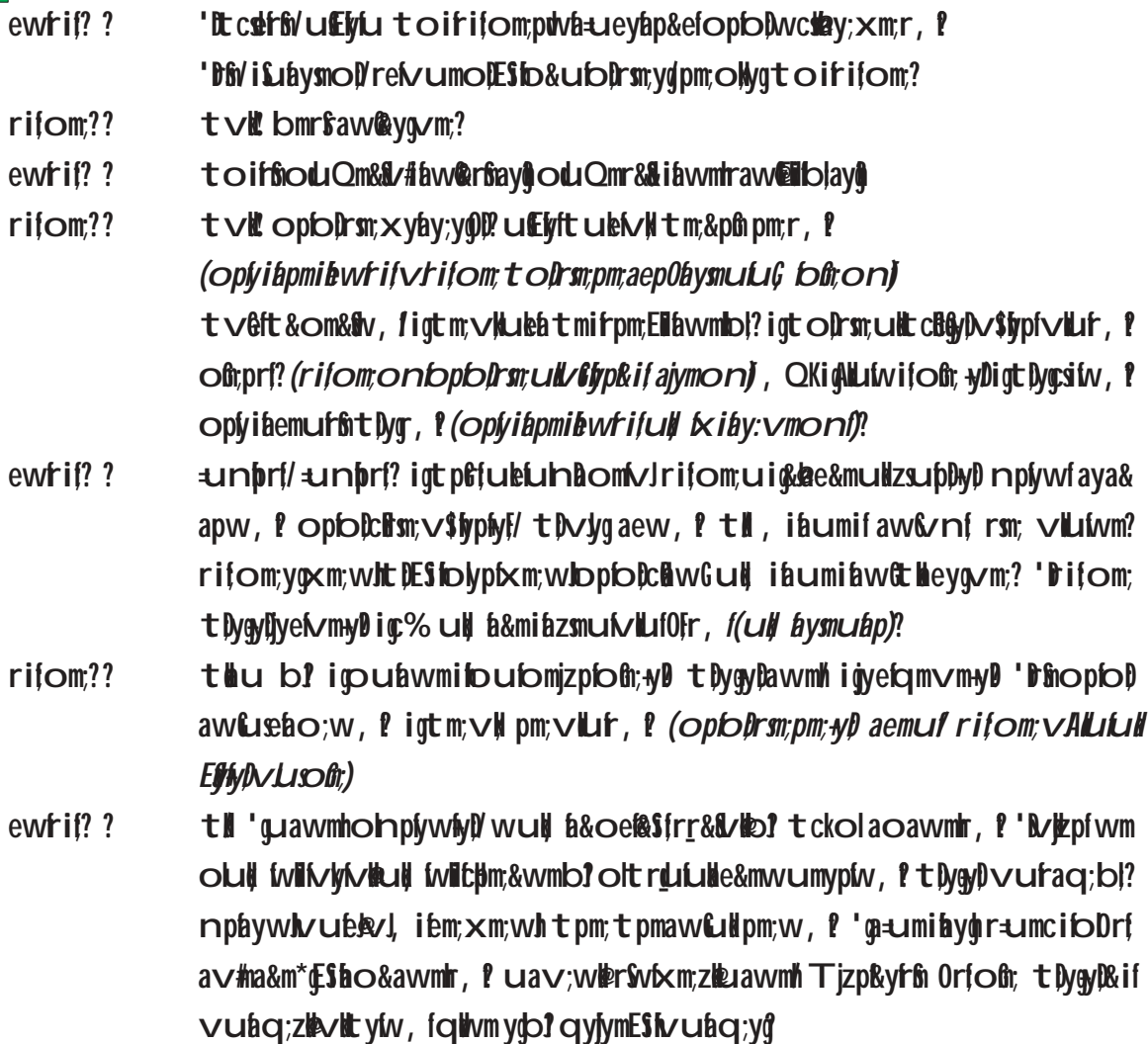
Prince Oh! There is nothing.

Spirit You will see them if you have dignity.
If you do not , you will not see them.

Prince Oh! More fruits. I will eat them completely and delightfully.

(The spirit guard of the tree disappears while the prince is eating the fruits)
It's so delicious. I cannot even finish them all. So I will peel the fruits. Go away.
(He throws the fruit peels). Now I am full. I would like to defecate. I will do it behind the tree. *(The spirit guard of the tree appears)*

Spirit Look.....look. I help him with all my heart, but he spoils my surroundings with dirt by throwing all those fruit peels and now he is defecating!!!





Ohso many flies. They are eating all those fruits peels that he threw away and his faeces as well. Now he is coming back after defecation. I will disappear for a while (*Disappear*)

Prince

Ok! I feel comfortable now. After defecation, I am hungry again. Here are the rest of the fruits, I will eat them all. (*After eating the fruits, the prince fell down while holding his stomach*)

Spirit

That is because he is dirty and has no personal hygiene. He has got the disease and now he will die. That is because of what he has done to himself.

He threw the garbage everywhere and he did not wash his hands after defecation. And with dirty hands, he ate the fruits on which the flies have landed. That is the reason he will die of diarrhoea. That is why children must remember this case and you must wash your hands with soap after defecation.

Note:

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