

ENVIRONMENTAL SANITATION

Sanitation

- is the hygienic means of preventing human contact from the hazards of wastes to promote health



Some water, sanitation and health –WSH- numbers

1. Faecal-oral

1. Diarrhoeal disease

1. **2 million deaths/year from diarrhoea, mostly under 5**
(Jumbo jet crash every hour and a half)
2. **One billion cases/year**
3. **4.3% of Burden of Disease DALYs**
4. **88% (?) attributable to inadequate WSH**

2. 1/3 of developing world pop'n carry intestinal worms

3. 200 million infected by schistosomiasis (bilharzia)

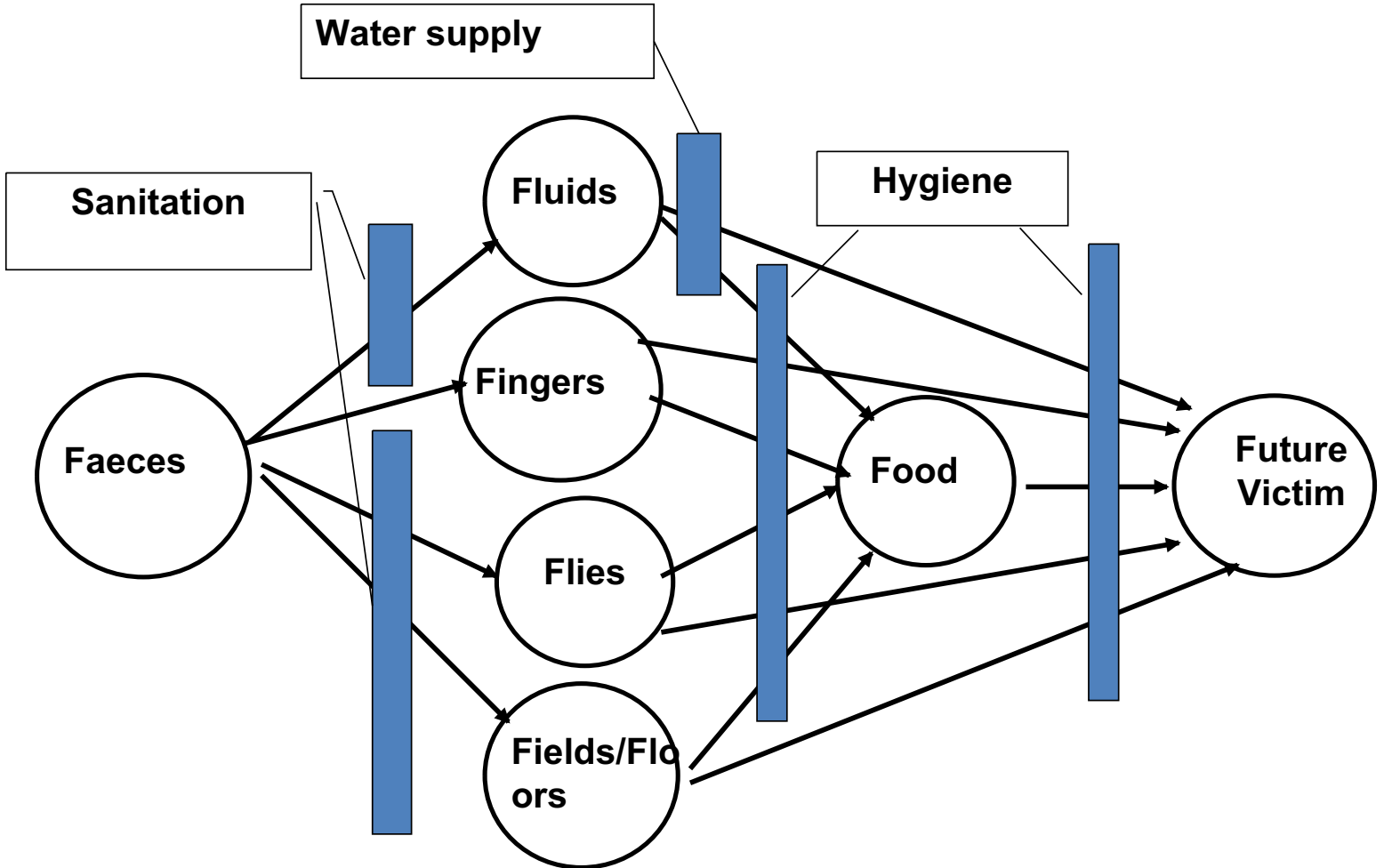
2. 6-9 million blind from trachoma (1/4 reduced by adequate water supply)

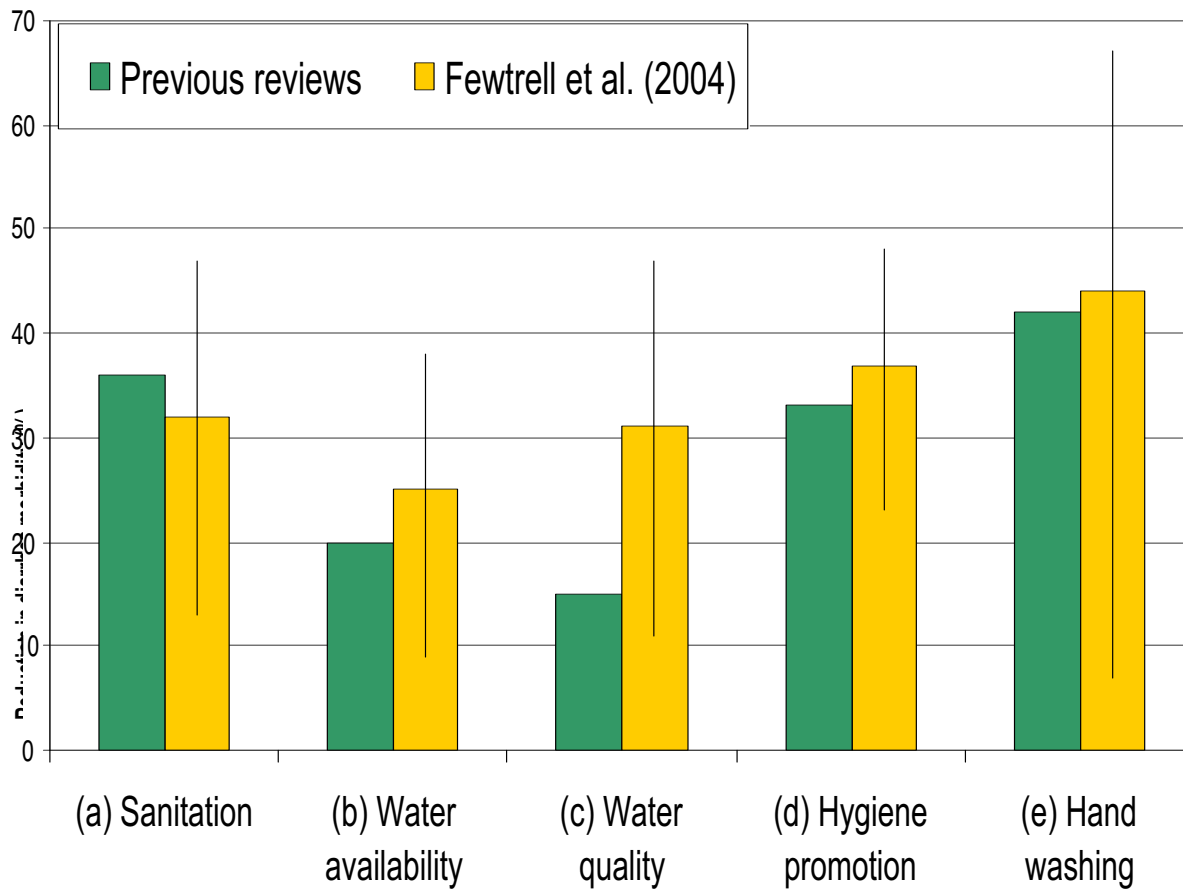
Classifications of disease

- Classification usually by organism (viral, bacterial, etc) or organ (diseases of head, heart, liver etc.)
- Classification by transmission route
 - If you know how it's spread, you know how to stop it

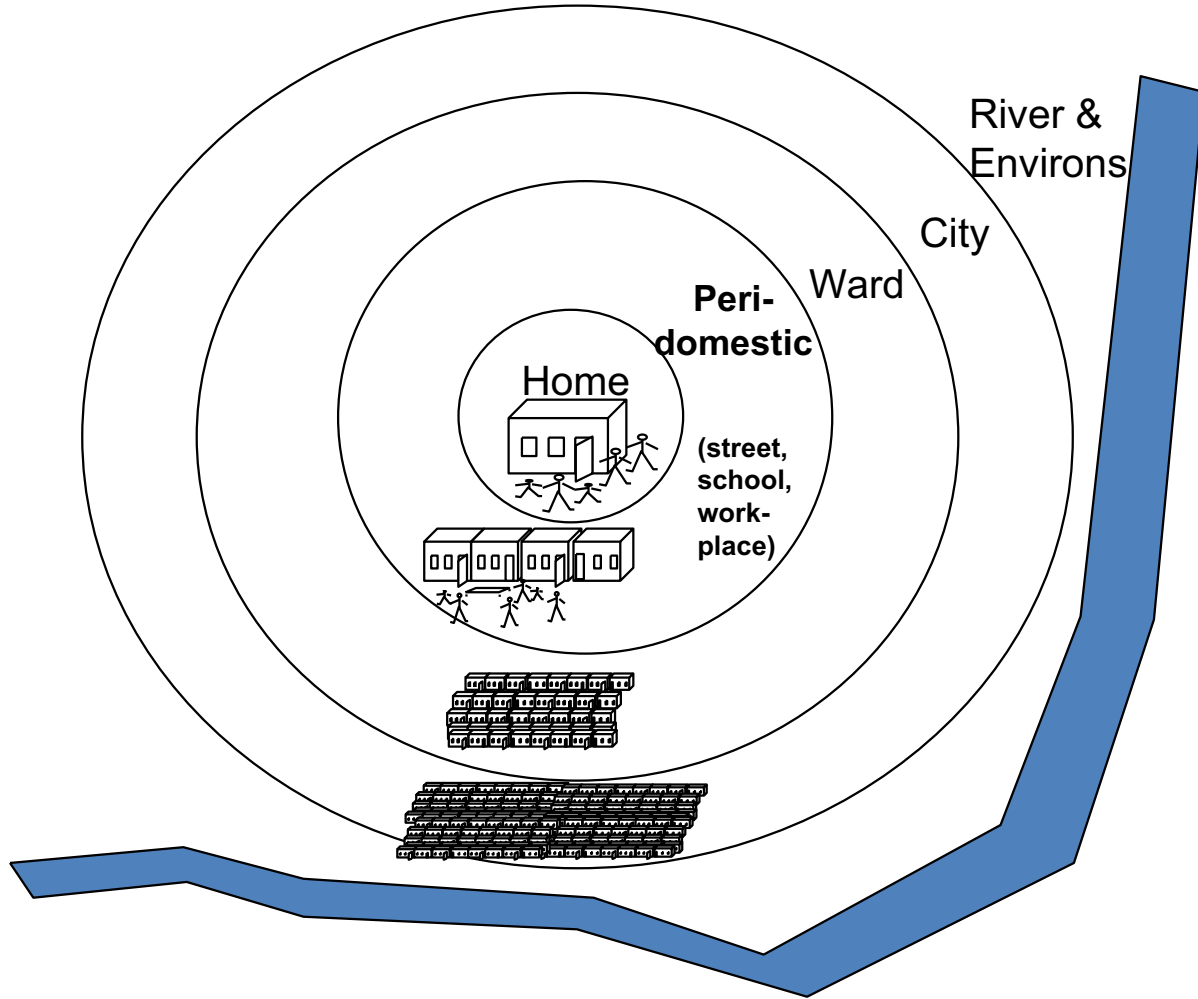
1. There is the direct impact of consuming contaminated water this is known as 'waterborne disease' and includes diarrhea , typhoid, viral hepatitis A, cholera, dysentery.
2. There is the effect of inadequate quantities of water being available for personal hygiene or the of un-hygienic practices which contaminate water and cause diseases. Without enough water, skin and eye infections (including trachoma) are easily spread, as are the faecal–oral diseases. These diseases are known as 'water-washed diseases'
3. There are 'water based diseases' and "water-related vector-borne diseases" in which the aquatic environment provides an essential habitat for the mosquito vectors and intermediate snail hosts of parasites that cause human diseases.
4. There is chemically contaminated water such as water containing excessive amounts of arsenic or fluoride. Some contaminants are added to drinking water as a result of natural processes and some due to human activities such as industry and mining.

The F-Diagramme

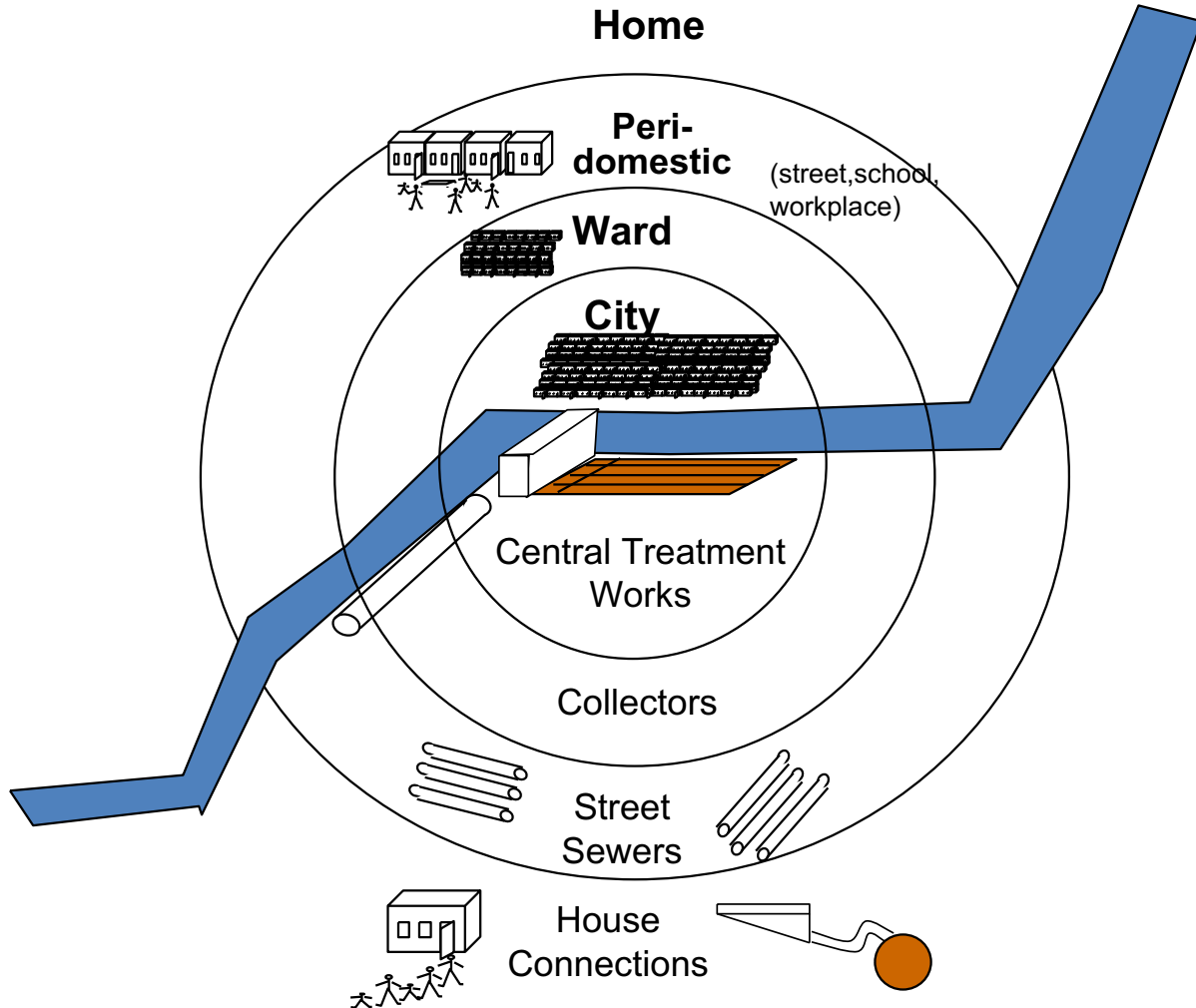




How people see their city



An environmental view



COMPONENTS OF ENVIRONMENTAL SANITATION

- WATER SANITATION
- FOOD AND MILK SANITATION
- EXCRETA DISPOSAL
- SEWAGE DISPOSAL
- REFUSE DISPOSAL
- VECTOR AND VERMIN CONTROL
- HOUSING
- AIR SANITATION

WATER SANITATION

WATER ANALYSIS CONSISTS OF:

- PHYSICAL
- CHEMICAL
- RADIOLOGICAL
- BIOLOGICAL
- BACTERIOLOGICAL

WATER SANITATION

- **PUBLIC WATER SUPPLY MUST BE-**
 - SAFE
 - REASONABLY SOFT
 - PLENTIFUL
 - CHEAP

WATER SANITATION

- **HOUSEHOLD TREATMENT OF WATER**
 1. **BOILING**, i.e., beyond 2 minutes
 2. **CHLORINATION**- 1-5ppm
 3. **IODINE TREATMENT**- 10 drops per gallon
 4. **FILTRATION**
 5. **AERATION**

Natural chemical hazards

- Arsenic
 - Skin lesions, various cancers
 - “20 to 60” million exposed in Bangladesh
- Fluorosis
 - Dental damage, crippling bone damage

WATER SANITATION CHEMICAL QUALITY

CHEMICAL	CONCENTRATION[mg/L]
Arsenic	0.2
Barium	1.0
Cadmium	0.01
Chromium	0.05
Cyanide	0.01
Lead	0.1
Selenium	0.05
Silver	0.05

FOOD AND MILK SANITATION

The GOLDEN RULE of food sanitation is:

“Keep it cold or hot, and keep it covered”

- 3 Enemies Of Food Storage:
 1. High Temperature
 2. High Humidity
 3. Contamination By Strong Odors

FOOD SANITATION: FOOD BORNE DISEASES

FOOD BORNE
INFECTION

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graph TD; A[FOOD BORNE INFECTION] --- B[BACTERIAL]; A --- C[ ]; A --- D[PARASITIC]; B --- B1["-Typhoid, Cholera, Bacillary dysentery, Salmonella"]; C --- C1[ ]; D --- D1["-Ascariasis, Trichinosis, Amoebiasis"];
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BACTERIAL
-Typhoid, Cholera,
Bacillary dysentery,
Salmonella

PARASITIC
-Ascariasis,
Trichinosis,
Amoebiasis

FOOD SANITATION: FOOD BORNE DISASE

FOOD POISONING
OR
INTOXICATION

BACTERIAL

- Staphylococcus
- Streptococcus
- Cl. botulinum

PLANT OR ANIMAL

- Mushroom
- Mussels
 - Fish
- Herbs

CHEMICAL

- DDT, Lead,
- Mercury, Cadmium

MILK SANITATION

- STERILIZATION- The application of high temperature for the purpose of destroying all types of microorganisms.
- PASTEURIZATION- The application of heat to milk for the purpose of destroying pathogenic microorganisms with minimum injury to the substance

MILK SANITATION

- Types Of Pasteurization:
 - Holding Or Vat Pasteurization: 142—143 F For 30 Mins.
 - High Temperature, Short Time [Htst]- 160-162 F For 15 Mins.
 - Flash Pasteurization- 190 F For Few Seconds.

EXCRETA DISPOSAL

- **METHODS :**

1. With Water Carriage

2. Without Water Carriage

EXCRETA DISPOSAL

1. Without Water Carriage

- Cat-hole
- Straddle Trench
- Sanitary Pit Privy
- Bored-hole
- Chemical Toilet
- Pail System
- Overhung Latrine -"Pour-flush"



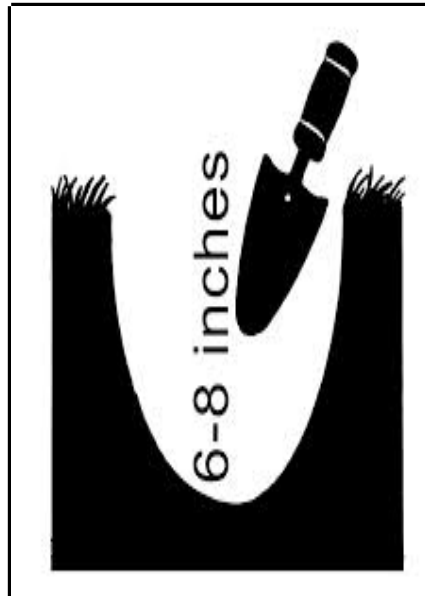
DISPOSA-JOHN



**INDIVIDUAL SERVICE
MEMBER FIELD TOILET**



DROP-BOX TOILET



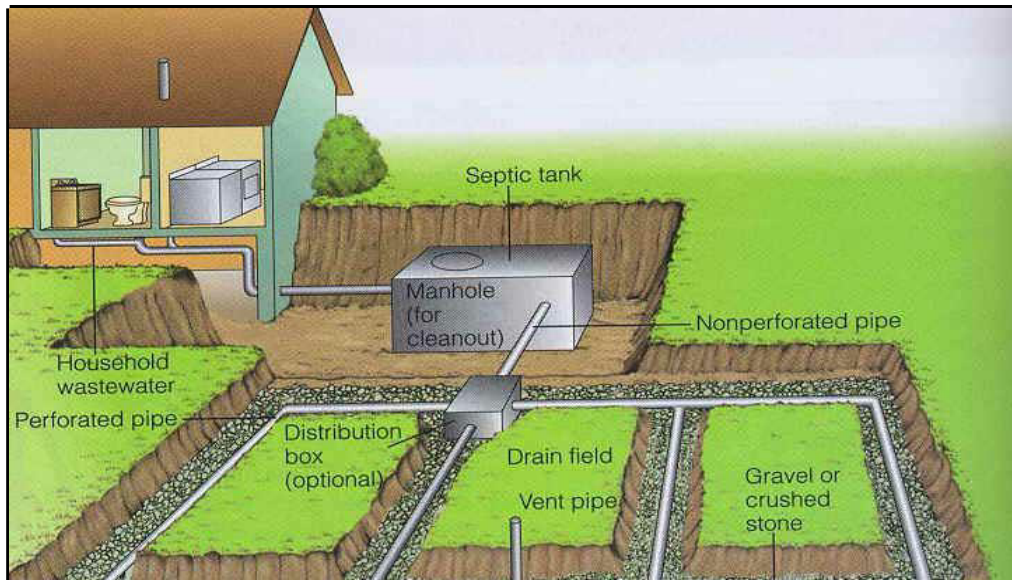
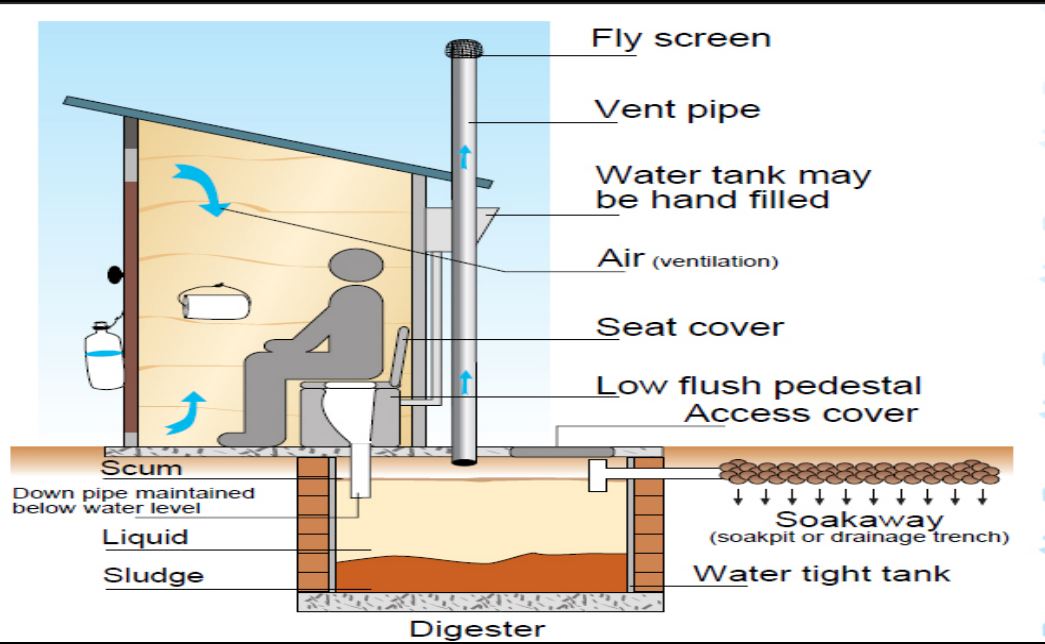
EXCRETA DISPOSAL

2. With Water Carriage

- Water Sealed

- Septic Toilet/Aqua Privy

- Imhoff Tank System



EXCRETA DISPOSAL

- **Characteristics Of Adequate Excreta Disposal Facilities For Rural Areas .**
 - Simple, Cheap And Easy To Construct
 - Easy To Maintain
 - Affords Easy Protection Against The Elements And Provide Desired Privacy
 - Acceptable To The Users

REFUSE/WASTE DISPOSAL

- **Refuse** Is A General Term Applied To Solid And Semi Solid Waste Materials Other Than Human Excreta

REFUSE DISPOSAL

- Public Health Reasons For Proper Disposal Of Wastes
 1. Breeding Place For Insects And Rats
 2. Gives Out Foul Smell
 3. “Eye Sore”
 4. Fire Hazard

REFUSE DISPOSAL

- Types Of Refuse
 - **Garbage:** Left-over Vegetables, Animal And Fish Material From Kitchens And Food Establishments.
 - **Rubbish:** Waste Material Such As Bottles, Broken Glass, Tin Cans, Waste Papers, Discarded Porcelainware, Pieces Of Metal, Wrapping Papers Etc.

REFUSE DISPOSAL

- Type Of Refuse:... Con't..
 - Ashes: Left-over From Burning Of Wood And Coal.
 - Dead Animals/ Carcasses
 - Stable Manure
 - Street Sweeping: Dust, Manure, Leaves, Cigarette Butts, Waste Paper And Other Materials That Are Swept From The Streets

REFUSE DISPOSAL

- Types Of Refuse ..Con't..
 - Night Soil: Human Waste Wrapped And Thrown Into Sidewalks And Streets
 - Yard Cuttings: Leaves, Branches, Grass

REFUSE DISPOSAL

- Characteristics Of Containers
 - Small Enough To Be Easily Carried
 - Sufficient In Number
 - Provided With Tight-fitting Covers
 - Made Of Sturdy Material
 - Steady
 - Placed In An Accessible Location

REFUSE DISPOSAL

- Community Refuse Disposal Methods:
 - Dumping On Land
 - Sanitary Landfill
 - Composting
 - Incineration
 - Reduction And Salvage

REFUSE DISPOSAL

- Refuse Disposal Methods For Households
 - Burial
 - Burning
 - Feeding To Animals
 - Composting
 - Grinding And Disposal To Sewer

REFUSE DISPOSAL

- Refuse Collection
 1. Frequent Collection Of Refuse, Specially Garbage, Is Necessary For Good Sanitation
 2. A Longer Interval Between Collection Creates Problem Of Storage And Foul Odor For The Homeowner

REFUSE DISPOSAL

- Refuse Collection:
3. It Is Necessary To Cover The Refuse In The Vehicles During Transportation To Final Disposal Sites To Prevent Flies, Minimize Odors Or Remove Traveling “Eye Sores”.
 4. It Is Important To Have Adequate And Properly Maintained Collection Carts, Trucks And Other Vehicles To Eliminate Collection Delays And Complaints From Residents.

REFUSE DISPOSAL

- REFUSE Collectionn...con't..
5. The Route To The Final Disposal Should Be As Direct As Possible From The Point Of Origin. It Should Preferably Not Pass Busy Streets.
 6. It Is Preferable To Have Collection Done At Night

VERMIN CONTROL

[RODENT AND INSECTS]

- Types
 1. Physical Or Mechanical
 2. Chemical
 3. Biological
 4. Environmental
 5. Educational

HOUSING SANITATION

- Characteristics Of An Acceptable House
 1. Adequate Space: At Least 50 Sq.Ft./Person For Bedroom
 2. Adequate Lighting: At Least 100 Ft.Candles For Reading
 3. Adequate Water Supply: 15-20 Gallons Per Capita Per Day

.....CONT.....

HOUSING SANITATION

- CHARACTERISTICS OF AN ACCEPTABLE House...[cont]...
 - Noise: Should Not Be More Than 30 Decibels
 - Adequate Heat And Ventilation
 - Equipped With Sanitary Toilet, Food Storage And Proper Refuse Disposal

What Does "Loud" Mean?

The loudness of sound is measured in decibels (dB). Most experts recommend that you use earplugs when exposed to 85 dB and above. But what does **85 dB** mean? The following chart shows common sounds and their associated sound levels.

20 dB	Ticking watch	85 dB	Average traffic
30 dB	Quiet whisper	95 dB	MRI
40 dB	Refrigerator hum	100 dB	Blow dryer, subway train
50 dB	Rainfall	105 dB	Power mower, chainsaw
60 dB	Sewing machine	110 dB	Screaming child
70 dB	Washing machine	120 dB	Rock concert, thunderclap
80 dB	Alarm clock (two feet away)	130 dB	Jackhammer, jet plane (100 feet away)

Sanitation Requirements In Emergency Situations

Water

- Minimum Demand Per Person Per Day: 50 Lts
- Quality Control
 - To Preserve Public Health, A Large Amount Of Reasonably Safe Water Is Preferred Over A Small Amount Of Purified Water.
 - Bacteriological, Biological, Chemical, Physical And Radiological Quality Of Water Must Be Deemed Safe.
 - ..[Cont...]

..IN EMERGENCY SITUATIONS

- Water

Quality Control...[cont..]

- **There Must Be No Fecal Coliforms Per 100 ml. At The Point Of Delivery**

- **People Drink Water From A Protected Or Treated Source In Preference To Other Readily Available Water Sources.**

...IN EMERGENCY SITUATIONS

- **Other Sanitary Requirements :**

- Latrine

- » __One /Family
- » ----Min. 1 Seat/20 Persons
- » --- 50 Meters Away From Houses

- Waste Disposal

- One Communal Pit/500 Persons [2x5x2 M]

- Soap

- » 250g/Person/Mo

...Cont...

...IN EMERGENCY SITUATIONS..

- **OTHER REQUIREMENTS... Cont...**
 - **Shelter**
 - Individual: 4 Sq.M./Person
 - Collective: 30 Sq,m,/Person [Including Shelter, Sanitation Services, Community Activities, Warehousing, Access Etc]

Environmental Sanitation

- The Most Common And Most Practical Disinfecting Agent For Drinking Water:
 - A. Ozone
 - B. Silver
 - C. Uv Rays
 - D. Chlorine

Air Pollution

- The Most Important Air Pollution Problem In Urban Areas Are Those That Come From:
 1. Acid Rain
 2. Automobiles
 3. Factories
 4. Burning Of Trash
 - A Gas Produced By The Biodegradation Of Organic Waste
 5. Oxygen
 6. Methane
 7. Carbon Monoxide
 8. Carbon Dioxide

The Most Widely Practiced Sanitary Control Measure For Milk Quality

1. Bacterial Count
2. Coliform Count
3. Pasteurization
4. Chlorination

Chlorination Of Water Removes

1. Odor
2. Bacteria
3. Bad Taste
4. Turbidity

Turbidity Of Water Can Be Removed By

- A. Boiling
- B. Coagulation
- C. Chlorination
- D. Filtration

The Control Of The Environment To Prevent Communicable Disease Is

1. Disinfection
2. Sterilization
3. Sanitation
4. Surveillance

