

Water- Related Diseases



Water Related Diseases

- WHO recognizes that access to adequate water supplies is a fundamental human right.
- Water-related diseases are a human tragedy , killing millions of people each year (account for 80% of all deaths in developing countries).



Global Morbidity and Mortality Rates

	Number/Year or Total Reported	
	Cases of disease	Deaths
Cholera	384 000	11 000
Typhoid	500 000	25 000
Giardiasis	500 000	low
Amoebiasis	48 000 000	110 000
Diarrhoeal disease	1 500 000 000	4 000 000
Dracunculiasis (guinea-worm)	> 5 000	-
Schistosomiasis	200 000 000	800 000

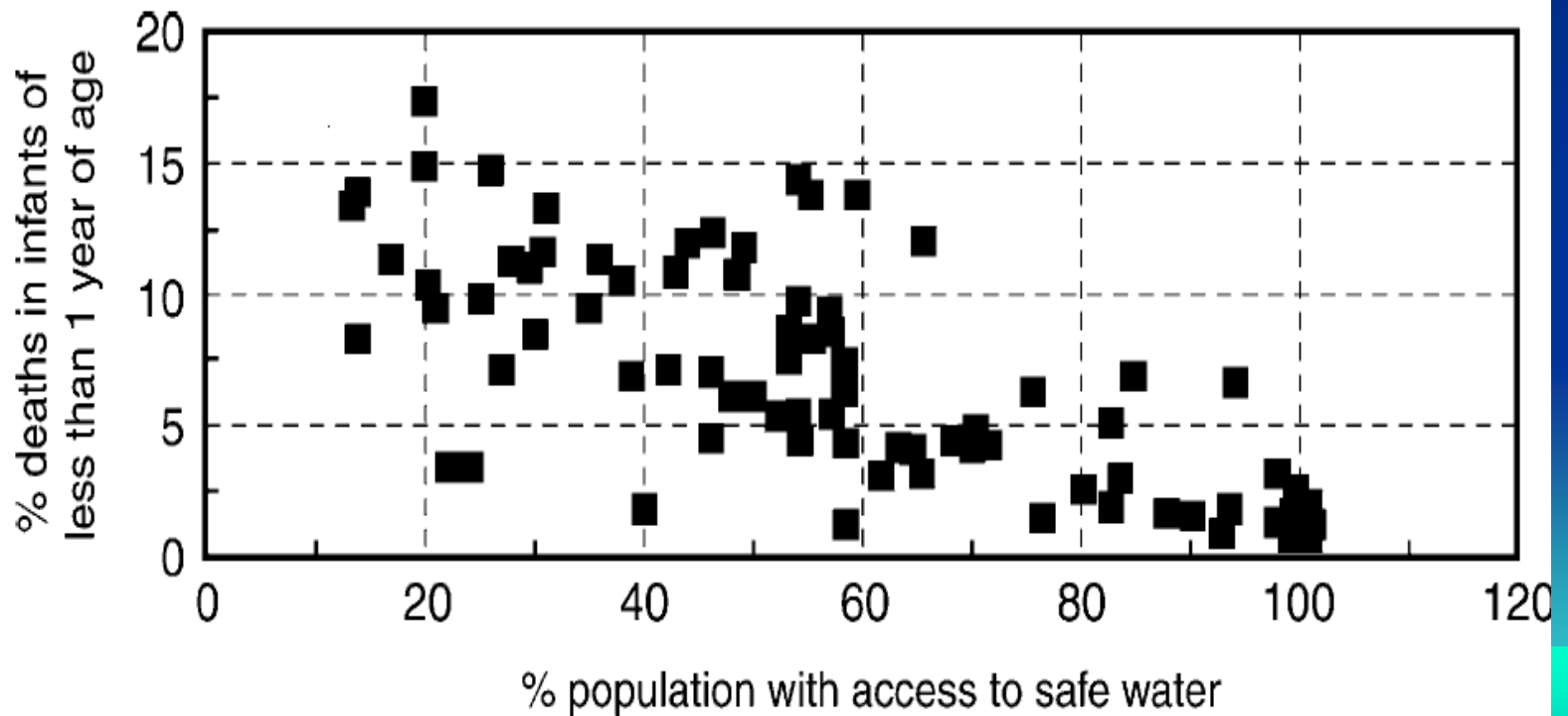
- Improved water supply and sanitation will lead to reduced incidence of morbidity and mortality (this may be up to 100% for some diseases such as tyhpoid or dracunculiasis).



Potential Reductions in Morbidity for different Diseases as a Result improvements in Water Supply and Sanitation

Diseases	Projected reduction in morbidity (%)
Cholera, thyphoid	80 – 100
Diarrhoeal diseases, dysentery, gastroenteritis	40 – 50
Dracunuliasis	100
Schistosomiasis	60 - 70

Infant Mortality versus Access to Safe Water

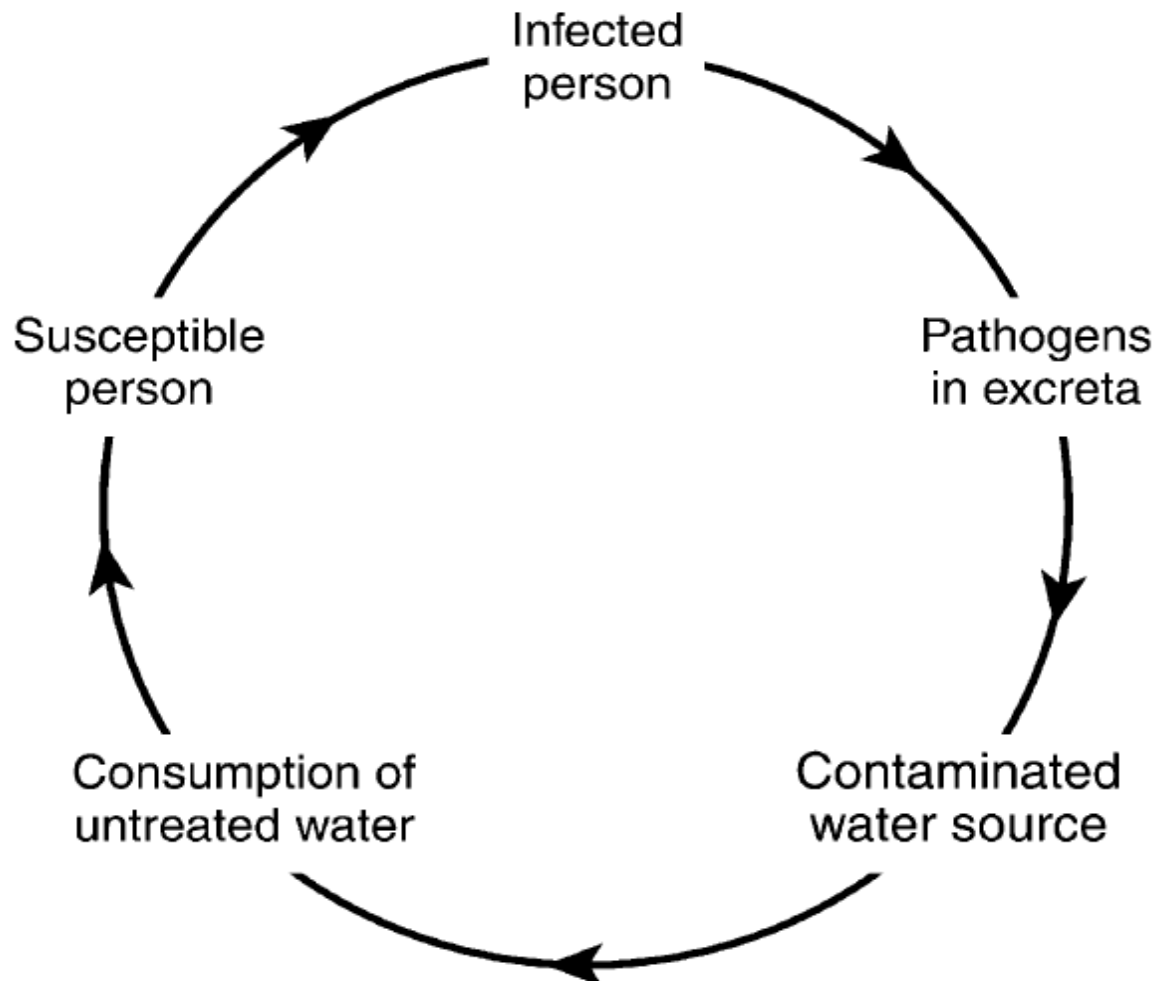


Disease Transmission

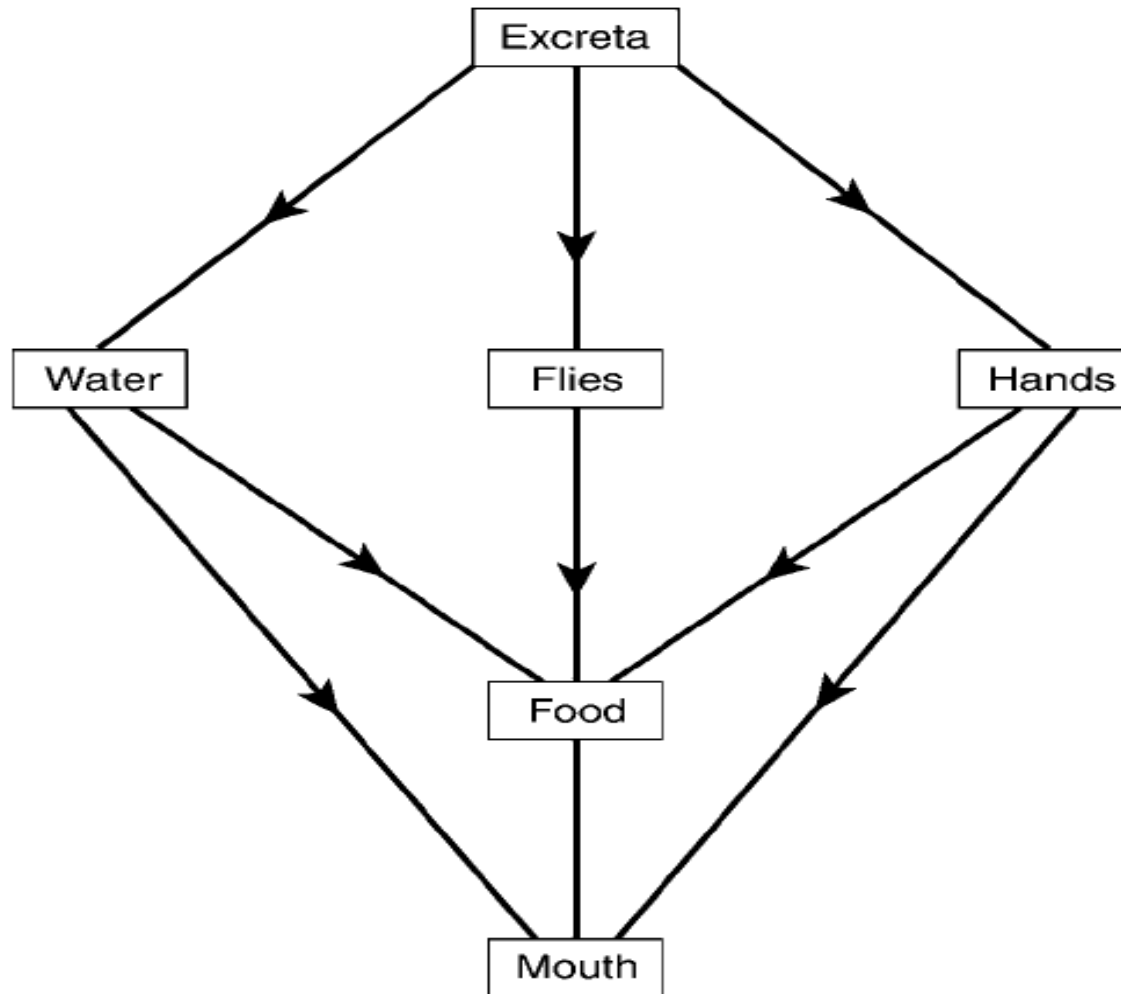
- Many diseases may be transmitted via the fecal-oral route ,and that occurs when human faecal is ingested through drinking contaminated water or eating contaminated food .



The Classical Waterborne Infection Cycle



The Faecal-Oral Route of Diseases Transmission



Pathogens in Water-related Diseases

Disease	Cause
Typhoid ,cholera ,Bacillary dysentery	Bacterial infections
Hepatitis ,poliomyelitis	Viral infections
Amoebic dysentery	Protozoal infections

Water-related Diseases Can be Classified into :

- Water-borne diseases .
- Water-based diseases.
- Water-related vector diseases.
- Water-scarce (also called water-washed) diseases.



Waterborne Diseases

- Water borne diseases are “dirty-water“ diseases – those caused water that has been contaminated by human ,animal ,or chemical wastes .



Water-based Diseases

- Water-based diseases :are caused by aquatic organisms that spend part of their life cycle in the water and another part as parasite of animals.



Water-related Vector Diseases

- Water-related vector diseases: that are transmitted by vectors-insects or other animals .



Water-scarce Diseases (Water-washed Diseases.

- Water-scarce diseases: thrive in conditions where freshwater is scarce and sanitation poor



Classification of Water-related Diseases

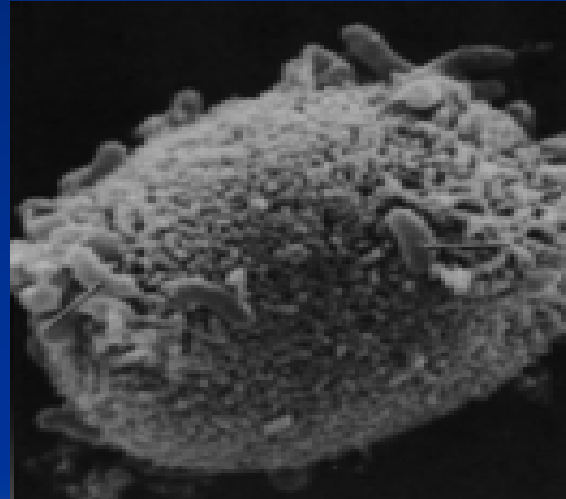
Group	Diseases
<i>Water-borne diseases</i> (diseases transmitted by water)	Cholera; Typhoid; Bacillary dysentery Infectious hepatitis; Giardiasis
<i>Water-washed diseases</i> (caused by lack of water)	Scabies; Skin sepsis and ulcers; Yaws; Leprosy; Lice and thypus; Trachoma; Dysenteries; Ascariasis; Parathphoid
<i>Water based diseases</i>	Schistomiasis; Dracunuliasis; Bilharziosis; Filariasis; Threadworm
<i>Water-related insect vector diseases</i>	Yellow fever Dengue fever Bancroftian filariasis Malaria Onchocerciasis

Major Waterborne Diseases

- Cholera:

Cause: Bacteria

Symptoms :diarrhoea
,vomiting, dehydration
lead to death.



Major Waterborne Diseases

- **Amoebic dysentery:**

Cause: Protozoa

Symptoms :diarrhoea, dehydration.

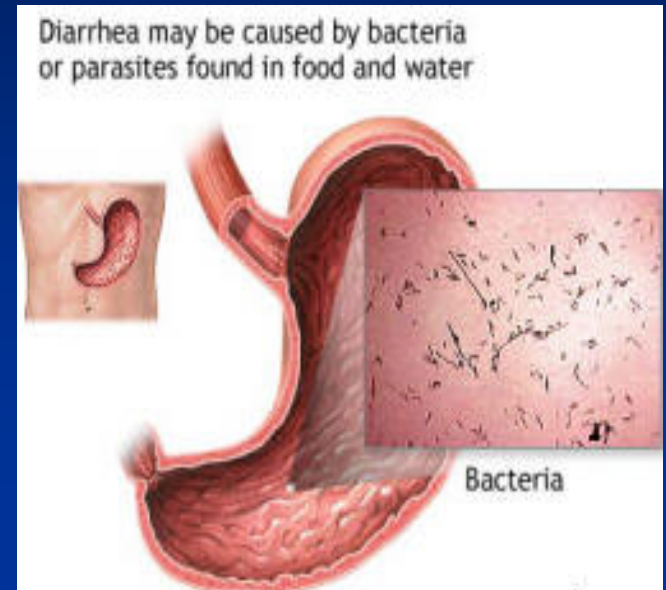


Major Waterborne Diseases

- Diarrheal disease (including amoebic and bacillary dysentery)

Cause: Bacteria, Viruses, and Protozoa

Symptoms: diarrhoea, dehydration.

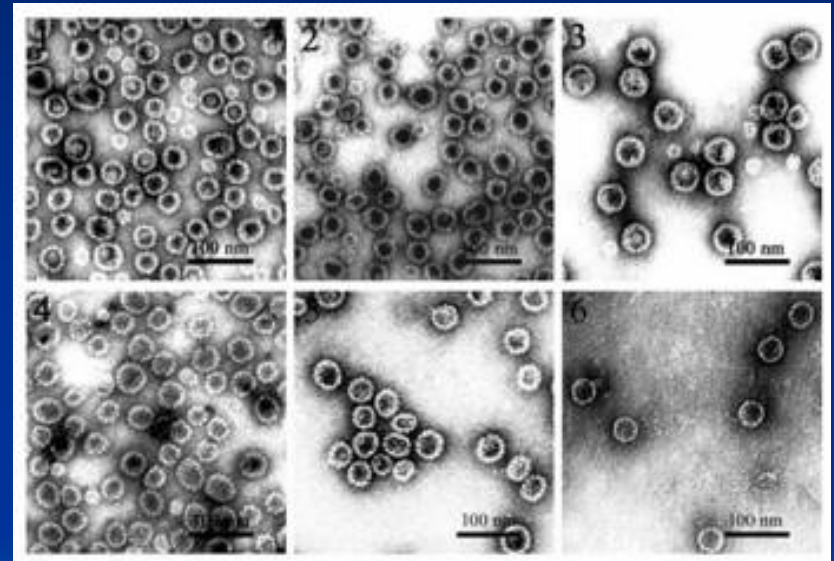


Major Waterborne Diseases

- **Hepatitis**

Cause: Viruses
HAV, HEV

Symptoms :body
weakness, loss of
appetite, abdominal
discomfort.



Major Waterborne Diseases

- Typhoid

Cause: Bacteria

Symptoms :diarrhoea, dehydration.



Major Water-Based Diseases

- **Ascariasis**

Cause : parasitic
roundworms

Symptoms: enlargement of
liver, toxicity, pneumonia
, nutritional deficiency.

Transmission:

Faecal –soil- oral



Major Water-Based Diseases

- **Dracunculiasis**
(guinea worm)

Cause : worm

Symptoms : fever,
burning sensation

Transmission:

cutaneous – cyclops -
cutaneous



Major Water-Based Diseases

- Paragonimiasis

Cause : worm

Symptoms : cough, nutritional deficiency.

Transmission:

faecal – snail – fish- oral



Major Water-Based Diseases

- Schistosomiasis (bilharzia)

Cause : worm

Transmission:

Urine/faeces – snail – cutaneous



Major Water-Related Vector Diseases

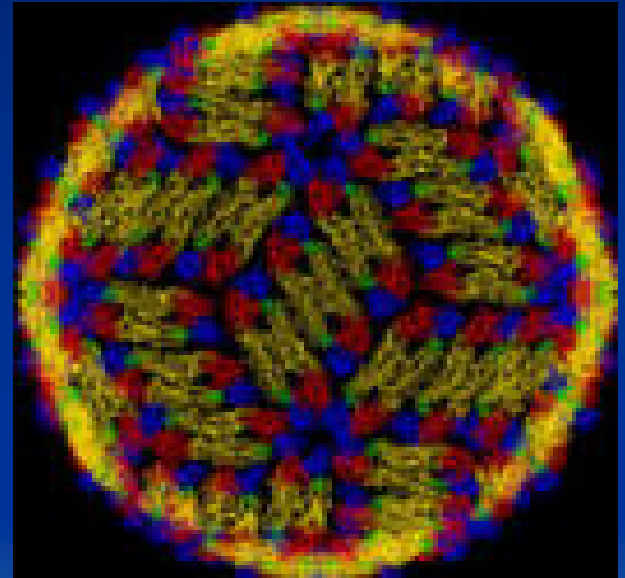
- Dengue fever(bone crusher disease)

Cause : virus

Symptoms

fever, chills, headache, pain in joints

Transmission: mosquito bite



Major Water-Related Vector Diseases

- Filariasis (includes elephantiasis)

Cause : worm

Symptoms:

damage and swelling in lymphatic vessels

Transmission: mosquito bite



Major Water-Related Vector Diseases

- **Malaria**

Cause : Protozoa

Symptoms:

Fever ,headache
,destroy liver and
nerves

Transmission: mosquito
bite



Table 1: Diseases related to water and sanitation

Group	Disease	Route leaving host	Route of infection
Diseases which are often water-borne	Cholera	faeces	oral
	Typhoid	faeces/urine	oral
	Infectious hepatitis	faeces	oral
	Giardiasis	faeces	oral
	Amoebiasis	faeces	oral
	Dracunculiasis	cutaneous	percutaneous
Diseases which are often associated with poor hygiene	Bacillary dysentery	faeces	oral
	Enteroviral diarrhoea	faeces	oral
	Paratyphoid fever	faeces	oral
	Pinworm (Enterobius)	faeces	oral
	Amoebiasis	faeces	oral
	Scabies	cutaneous	cutaneous
	Skin sepsis	cutaneous	cutaneous
	Lice and typhus	bite	bite
	Trachoma	cutaneous	cutaneous
	Conjunctivitis	cutaneous	cutaneous
Diseases which are often related to inadequate sanitation	Ascariasis	faecal	oral
	Trichuriasis	faecal	oral
	Hookworm	faecal	oral/
	(Ancylostoma/Necator)		percutaneous
Diseases with part of life cycle of parasite in water	Schistosomiasis	urine/faeces	percutaneous
Diseases with vectors passing part of their life cycle in water	Dracunculiasis	cutaneous	percutaneous

adapted from Bradley, D J, London School of Hygiene and Tropical Medicine, various

Causes of waterborne diseases

- Lack of proper sanitation (sewage treatment is inadequate .Instead ,human wastes disposed in open canals) .
- Using contaminated sewage for fertilizers.
- Agricultural chemicals , pesticides ,and industrial wastes .



Prevention of waterborne diseases

- Improving public sanitation.
- Providing a clean water supply



Causes of water-based diseases

- Stagnant water behind dams and water channels is ideal for snails .
- Lack of proper sanitation and clean water supply.



Prevention of water-based diseases

- Washing vegetables in clean water .
- not entering infected rivers .
- Eating well-cooked meat.
- In areas where guinea worm is endemic ,people can use piece of cloth to filter water .
- Hygienic disposal of human wastes .
- Building the water channels in fast –flowing streams to make it difficult for snails to survive.



Causes of water-related vector diseases

- Lack of appropriate water management .
- Construction projects often increase the mosquito population . Pools of stagnant water .
- Mosquitoes are developing resistance to DDT.



Prevention of water-related vector diseases

- Eliminate the insects that transmit the diseases (be careful when using pesticides).
- Use bednets .
- Introduce natural predators .
- Use of polystyrene spheres floating static water ,the mosquito larvae die from lack of air.



Prevention of water-related vector diseases

- Covering water storage containers.
- installing sprinkler instead of canals.
- Integration education about disease prevention into health services.



Waterborne diseases caused by chemical substances

- **Arsenicosis**

Cause : high levels of arsenic (GV =0.01mg/l)

Symptoms

Skin cancer diabetes, bladder cancer ,high blood pressure ,..



Waterborne diseases caused by chemical substances

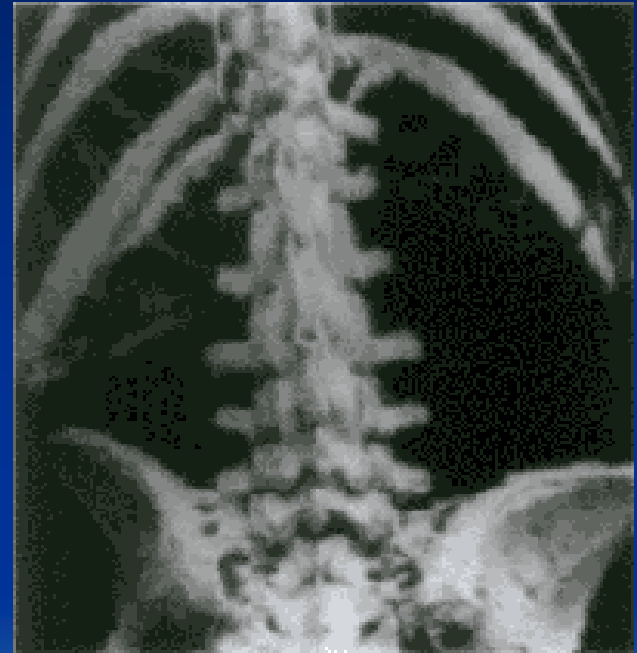
- **Fluorosis**

Cause : high levels of fluorine

(GV=1.5 mg/l)

Symptoms:

Severe skeletal problems.



Waterborne diseases caused by chemical substances

- **Methaeglobinemia**

Main Cause : high levels of nitrates(GV=50mg/l)

Symptoms:

Blueness around the mouth ,vomiting , diarrhoea.



Waterborne diseases caused by chemical substances

- **DDT and heptachlor (pesticides)**
(heptachlor GV = .03 mg/l)

Symptoms:

Cause cancer, neurological disease

(In Dakka, heptachlor residues in water sources reached .789 mg/l).



Waterborne diseases caused by chemical substances

- Lead

Symptoms:

- Affect the central nervous system.

- Petrochemicals

Symptoms:

- Cause cancer even at low exposure .

