

B. Jain

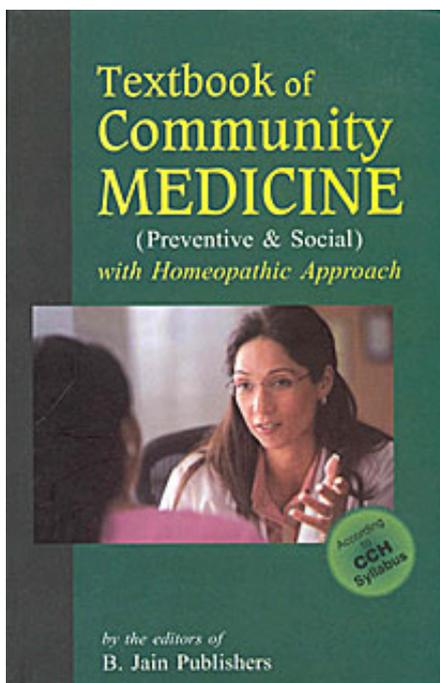
# Textbook of Community Medicine (Preventive & Social)

Extrait du livre

[Textbook of Community Medicine \(Preventive & Social\)](#)

de [B. Jain](#)

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## CHAPTER-12

# ENVIRONMENT AND HEALTH

## ENVIRONMENT AND HEALTH

### Environment

Living and non living objects surrounding the man. It is divided into three components :

- (a) Physical : Water, air, soil, etc.
- (b) Biological : All living organisms.
- (c) Socio-economical : Customs, income, religion, caste, etc.

### Sanitation

As per national sanitation foundation, USA "Sanitation is a way of life. It is the quality of living that is expressed in the clean home, the clean farm, the clean business, the clean neighbourhood and the clean community. Being a way of life it must come from within the people; it is nourished by knowledge and grows as an obligation and an ideal in human relations".

WHO defines 'environmental sanitation' as 'the control of all those factors in man's physical environment which exercise or may exercise a deleterious effect on his physical development, health and survival<sup>1</sup>.'

Now, the term 'environmental health' is in use instead of 'environmental sanitation'. The very aim of 'environmental health' is to promote health by providing safe water, sanitation safe housing etc.

## ENVIRONMENTAL HEALTH SERVICES

These services include :

- (1) Providing safe and wholesome water.
- (2) Efficient sanitation facilities, safe disposal of excreta and waste products arising out of human activities includes both solid and liquid.

- (3) Control of water pollution.
- (4) Management of air quality.
- (5) Control of noise pollution.
- (6) Control of vectors like mosquitoes, rodents, flies.
- (7) Maintenance of quality of consumer products.
- (8) Control of adulteration of food items.
- (9) Safe housing facilities.

## **WATER**

Most of diseases in the developing world are caused by polluted water. Lack of safe and wholesome water is one of the major problems that developing countries like India faces today. Safe drinking water has been one of the basic components of 'Primary Health Care'.

**SAFE AND WHOLESOME WATER** by definition is the water which is free from pathogenic agents, harmful chemical substances, pleasant to taste, free from colour and odour and fit for human consumption.

### **Requirements**

It is expressed as litres per capita per day. For physiological purposes the drinking water requirement is about 2 litres per capita per day.

For domestic purposes it is about 150-200 litres per capita per day. In India 40 litres per capita per day is the target to be achieved.

### **Uses of Water**

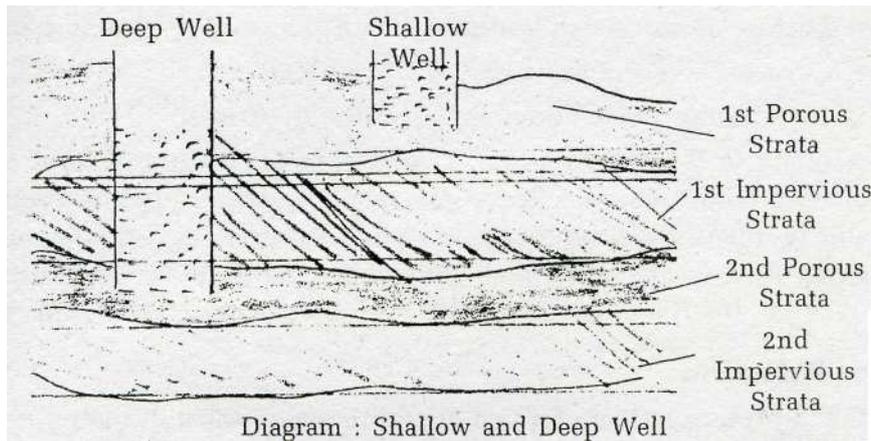
- (i) Domestic - Drinking, cooking, bathing.
- (ii) Public - Markets, fire control, swimming pools etc.
- (iii) Sanitary - Sewerage system, toilets etc.
- (iv) Industrial - In various industries like chemical, steel.
- (v) Agricultural - For irrigation.
- (vi) For producing electricity i.e. hydroelectricity.
- (vii) Commercial - Ice, cold drinks, etc.

### **Sources of Water**

Water is a natural resource available in vast quantity but not all of the water present in the world is usable. Only a limited number of water sources are there for providing usable water. The three main sources are :

- (1) Rain.

- (2) Surface water
  - Impounding reservoirs.
  - Rivers.
  - Tanks, ponds, lakes.
- (3) Ground water
  - Shallow Well.
  - Deep Well.



Difference between shallow and deep well :

<b>Shallow Well</b>	<b>Deep Well</b>
(i) Draws water from 1st porous strata situated above 1st impervious layer.	(i) Draws water from 2nd porous strata situated below 1st impervious layer.
(ii) Yield of water is less,	(ii) More yield.
(iii) May dry in summer,	(iii) Supplies throughout the year.
(iv) Water is hard.	(iv) Much harder water.
(v) Water obtained is likely to be contaminated.	(v) Free from contamination.

### Sanitary Well

It is a well which- is properly located, well constructed and protected against the danger of contamination.

It should not possess steps and should be located at least 15 m (50 feet) from likely sources of contamination. But it should be within 100 m distance from residential area to facilitate use. Various important parts of a sanitary well are :

- (i) *Lining* - It should be made up of bricks or stones and cement. The lining of the well should go upto a depth of at least 6 m.

The lining should be above the ground for a distance of 100 cms.

- (ii) *Parapet* - It is situated around the mouth of well and should be made up of cement. Its height should be 70-75 cms.
- (iii) *Platform* - It is made up of cement and extends at least 1 m in all directions around the well. It should have a slope away from the well.
- (iv) *Drain* - It carries spilled water to a public drainage system.
- (v) *Covering* - To close the top of the well.
- (vi) *Handpump* - For drawing the water from well.

A sanitary well is a very useful source of water mainly in rural area. Its proper care and maintenance is the responsibility of the consumers. It should be disinfected regularly. Washing, bathing, etc. should not be allowed in the vicinity of well. Regular monitoring of water quality is also essential *Health Education* should be given to all the users.

### Water Pollution

It is the presence of any foreign matter in water. Most of the pollution is man made. The sources of pollution are :

- (i) *Sewage* - Includes organic matter, microbes, etc.
- (ii) *Industrial waste* - Toxic chemical substances, (iii)  
Agricultural pollutants - Night soil, fertilizers, (iv)  
Physical pollutants - Radioactive substances, heat.

The water contamination results in more than 50 million illnesses every year in India with more than 5 million deaths. Various water borne disease are :

- (i) *Viral* - Include hepatitis A, E, polio, etc.
- (ii) *Bacterial* - Typhoid, salmonellosis, cholera, diarrhoeas.
- (iii) *Protozoa*] - Amoebiasis, giardiasis.
- (iv) *Helminthic* - Round worm, thread worm.

### Water Quality

It is usually assessed from acceptability, chemical, microbiological and radiological parameters.

The quality of water from microbiological point of view is very important. Presence of *E. coli* and other coli forms are indicative of sewage contamination of water.

## **Acceptability Aspects**

### **Physical Parameters**

#### **Taste and odours**

Taste and odour originate from natural and biological sources of processes from contamination by chemicals water treatment (chlorination).

Taste and odour in drinking water may be indicative of some form of pollution or of malfunction during water treatment or distribution. The cause of tastes and odours should be investigated and the appropriate health authorities should be consulted. No health based guideline value is proposed for taste and odour.

#### **Temperature**

Cool water is generally more potable than warm water. High water temperature enhances the growth of micro organisms and may increase, taste, odour and colour and corrosion problems.

#### **Colour**

It is due to coloured organic matter and humus concentration of soil, iron and other metals. The source of colour should be always investigated. Colours above 15 to 0 (true colour units) are detectable with naked eye.

#### **Turbidity**

Turbidity in drinking water is due to particulate late matter. High levels of turbidity can protect micro organisms from the effects of disinfection and can stimulate bacterial growth. The turbidity must be low so that disinfection can be effective. The appearance of water with a turbidity of less than 5 nephelometric turbidity units is usually acceptable to consumers. No health based guideline for turbidity has been proposed.

### **Inorganic Constituents**

#### **Aluminium**

The presence of aluminium at concentrations in excess of 0.2 mg/litre often leads to consumer complaints as hydroxide floe in distribution system occurs.

#### **Ammonia**

The threshold odour concentration of ammonia at alkaline pH is approximately 1.5 mg/litre and a taste threshold of 35 mg/litre has been proposed for the ammonium cation.

**Chloride**

High concentrations of chloride give an undesirable taste to water and beverages. Taste thresholds for the chloride anion are in the range of 200-300 mg/litre for sodium, potassium and calcium chloride. No health based guideline value is proposed for chloride in drinking water.

**Copper**

Copper in public water supplies increases the corrosion of galvanized iron and steel fittings. At levels above 5 mg/litre, it also imparts colour and an undesirable bitter taste to water.

**Hardness**

Public acceptability of the degrees of hardness of water varies. The taste threshold for the calcium ion is in the range of 100-300 mg/litre.

Hard water on heating forms deposits calcium carbonate scale. Soft water, with hardness of less than 100 mg/litre may on the other hand, have a low buffer capacity and so be more corrosive for water pipes. No health based guideline value has been proposed for hardness.

**Hydrogen Sulphide**

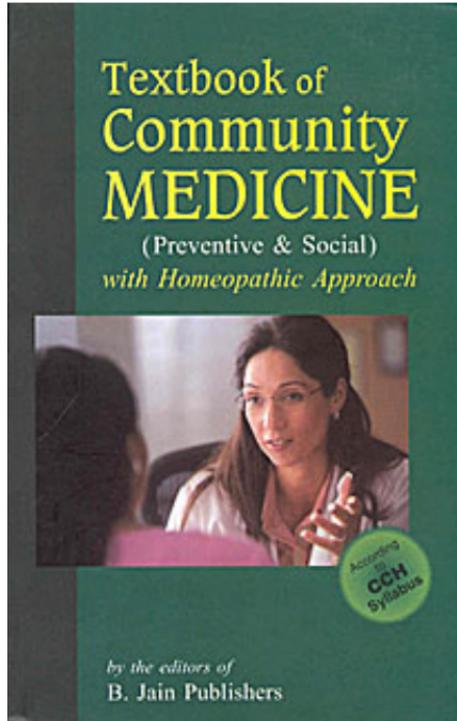
The taste and odour thresholds of hydrogen sulphide in water are estimated to be between 0.05 and 0.1 mg/litre. The "rotten eggs" odour of hydrogen is particularly noticeable in some ground waters and in stagnant drinking water.

**Iron**

Iron promotes the growth of "iron bacteria". At levels about 0.3 mg/litre iron stains laundry and plumbing fixtures. There is usually no noticeable taste at iron concentrations below 0.3 mg/litre although turbidity and colour may develop. No health-based guideline value is proposed for iron.

**Manganese**

Although manganese concentrations below 0.1 mg/litre are usually acceptable to consumers. If it exceeds 0.1 mg/litre in water supplies, it stains sanitary ware and laundry and causes an undesirable taste. It is considered that taste impairment is minimal at levels below 250 mg/litre. As sulphate is one of the least toxic anions, no health-based guideline value has been derived.



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