Totally, smallpox is the only disease that has been eradicated. Three diseases have been seriously advanced as candidates for global eradication within the foreseeable future; polio, measles and dracunculiasis. The feasibility of eradicating polio appears to be greater than that of others.

SCREENING FOR DISEASES

Screening has been defined as "the search for unrecognized disease or defect by means of rapidly applied tests, examinations or other procedures in apparently healthy individuals".

The original screening programmes were for individual diseases such as tuberculosis, syphilis, etc. Over the years, the screening tests have steadily grown in number. Today screening is considered a preventive care function, and some consider it a logical extension of health care.

Screening differs from **periodic health examinations** in the following respects:

1. Capable of wide application.
2. Relatively inexpensive
3. Requires little physician-time. In fact the physician is not required to administer the test, but only to interpret it.

A screening test is not intended to be a **diagnostic test**. It is only an initial examination. Those who are found to have positive test results are referred to a physician for further diagnostic work-up and treatment.

Aims and Objectives of Screening

The basic purpose of screening is to sort out from a large group of apparently healthy persons those likely to have the disease or at increased risk of the disease under study, to bring those who are "apparently abnormal" under medical supervision and treatment.

Criteria for Screening

The criteria for screening are based on two considerations: The *disease* to be screened, and the *test* to be applied.

Disease

The disease to be screened should fulfil the following criteria before it is considered suitable for screening:

1. The condition sought should be an important health problem (in general, prevalence should be high).
2. There should be a recognizable latent or early asymptomatic stage.
3. The natural history of the condition, including development from latent to declared disease, should be adequately understood (so that we can know at what stage the process ceases to be reversible).
4. There is a test that can detect the disease prior to the onset of signs and symptoms.
5. Facilities should be available for confirmation of diagnosis.
6. There is an effective treatment.
7. There should be an agreed-on policy concerning whom treat as patients (e.g. lower ranges of blood press borderline diabetes).
8. There is good evidence that early detection and treatment reduces morbidity and mortality.
9. The expected benefits (e.g. the number of lives saved early detection) exceed the risks and costs.

When the above criteria are satisfied, then it would be appropriate to consider a suitable screening test.

Screening Test

The test must satisfy the criteria of acceptability, repeatable and validity, besides others such as yield, simplicity, safety rapidity, ease of administration and cost.

1. Acceptability

Since a high rate of cooperation is necessary, it is important that the test should be acceptable to the people at whom it is aimed. In general, tests that are painful, discomforting and embarrassing (e.g. rectal or vaginal examinations) are not in likely to be acceptable to the population in mass campaign.

CHAPTER

2

The Practice of Public Health

People's health in India needs substantial improvement. The situation is similar across the developing world, Bangladesh, Pakistan or beyond such as Indonesia, Thailand, Kenya, Brazil, etc. all have regrettably poor public health.[1] In India, little attention is paid to public health issues such as availability of clean drinking water, the sewerage system.[1] There is an urgent need to improve public health in India even though the task is overwhelming and undeniably complex.

Public health deals with 'protecting and improving the health of communities'. Broadly speaking, it includes actions, such as preventing the outbreak of infections, e.g. cholera or the spread of communicable diseases like HIV or preventing injuries due to road traffic accidents, falls and/or violence. It also includes promoting healthy lifestyle such as educating the public about (a) the importance of exercise or (b) the harmful effect of smoking or (c) harmful effect of second-hand smoking or (d) the importance of oral hygiene.[2-6]

Governments use public health initiatives or programmes to achieve their goals. These programmes or initiatives include—detecting and controlling outbreak of infectious diseases, proper town planning, providing clean drinking water, sewerage systems, garbage collection systems, provision of a road and traffic system that prevents road traffic accidents, provision of clean air and water, etc.[3-6] Some examples of national health programmes in India include the Integrated Child Development Scheme (ICDS), National Malaria Control Programme, National Cancer Control Programme, etc.[15–19]

Definition

Public

Knutson defined *PUBLIC* as 'of or pertaining to the people of a community, state, or nation.'[2]

Public Health

Given the difficulty in defining public health, the definition proposed by Charles Edward Amory Winslow in 1920 is still the most widely accepted.[3-5]

Winslow (1920) defined public health as **"The science and art of preventing disease, prolonging life and promoting physical and mental efficiency through organized community efforts for the sanitation of the environment, the control of communicable infections, the education of the individuals in personal hygiene, the organization of medical and nursing services for the early diagnosis and preventive treatment of disease, and the development of the social machinery to ensure everyone a standard of living adequate for the maintenance of health, so organizing these benefits as to enable every citizen to realize his birthright of health and longevity."**[3-5]

The focus of public health has expanded over time. Since its conception when the focus was asepsis to sanitary engineering, to preventative physical and mental health.

CHAPTER

3

Environment and Health

Man is living in a dangerous and highly complicated environment, and he is becoming more ingenious. If these trends continue it is feared that the very "quality of life" we cherish may soon be in danger.

The purpose of environmental health is to create and maintain ecological conditions that will promote health and thereby prevent disease. Major factors contributing to ill health in India are unsafe drinking water, unhygienic disposal of solid wastes and human excreta, poor housing, sanitation, air and noise pollution.

The foremost step in any health programme would be to eliminate, through environmental control, those factors which are hazardous to health.

WATER

Water quality is as important as water quantity. Much of the ill health is largely due to lack of safe drinking water. There can be no state of positive community health and well-being without safe water supply.[2]

Safe and Wholesome Water

Water intended for human consumption should not only be 'safe' but also 'wholesome'. A safe water is one that cannot harm the consumer, even when ingested over prolonged periods.

Safe, potable or wholesome water is defined as:

1. Free from pathogenic agents
2. Free from harmful chemical substances
3. Pleasant to taste
4. Usable for domestic purposes.

Sources of Water

Water sources conform to two criteria:

1. The quality of water must be acceptable.
2. The quantity must be sufficient to meet the present and future requirements.

***There are three main sources of water*:**

1. Rain
2. Surface water
   a. Impounding reservoirs
   b. Rivers and streams
   c. Tanks, ponds and lakes
3. Ground water
   a. Shallow wells
   b. Deep wells
   c. Springs

1. Rain

Rain is the prime source of water. A part of rainwater sinks into the ground to form groundwater. A part of it evaporates back into the atmosphere, and some runs off to form streams and rivers which flow ultimately into the sea. Some of the water in the soil is taken up by the plants and evaporated in turn by the leaves. This event is water cycle.

Characteristics

- Rainwater is the purest water.
- Physically, it is clear, bright and sparkling.
- Chemically, it is very soft water.

formerly designated as 'temporary' hardness is due to the presence of calcium and magnesium bicarbonates. The non-carbonate hardness formerly designated as 'permanent' hardness is due to the presence of calcium and magnesium sulfates.

Hardness in water is expressed in terms of 'milliequivalents per litre'(mEq/l).

Table 3.1: Classification of hardness of water

Classification	*Level of hardness (mEq/l)*
Soft water	Less than 1
Moderately hard	1–3
Hard water	3–6
Very hard water	Over 6

Disadvantages of Hardness

1. Hardness in water consumes more soap and detergents.
2. When hard water is heated, the carbonates are precipitated and bring about furring or scaling of boilers.
3. It affects cooking.
4. Fabrics washed in hard water with soap do not have a long life.

Removal of Hardness

The methods of removal of hardness are:

Temporary hardness

1. Boiling
2. Addition of lime
3. Addition of sodium carbonate.
4. Permutit process.

Permanent hardness

1. Addition of sodium carbonate.
2. Base exchange process.

Water Pollution

Water is never pure in a chemical sense. It contains impurities of various kinds—both dissolved and suspended impurities. These contain:

- Dissolved gases, e.g. hydrogen sulfide, carbon dioxide, ammonia, nitrogen.
- Dissolved minerals, e.g. salts of calcium, magnesium and sodium.
- Suspended impurities, e.g. clay, silt, sand, mud, and microscopic plants and animals.

Sources of Pollution

1. Sewages which contain decomposable organic matter and pathogenic agents.
2. Industrial and trade wastes which contain toxic agents.
3. Agricultural pollutants which comprise fertilizers and pesticides.
4. Physical pollutants and radioactive substances.

Hazards of Water Pollution

The hazards of water pollution is classified into two broad groups—biological and chemical.

1. ***Biological***: This includes water-borne diseases caused by the presence of infective agent or an aquatic host in the water.

   By the presence of infective agent:

   a. Viral—viral hepatitis, poliomyelitis, hepatitis-E
   b. Bacterial—cholera, typhoid, bacillary dysentry
   c. Protozoal—amoebiasis, giardiasis.
   d. Helminthic—roundworm, whipworm, threadworm.
   e. Leptospiral—weil's disease.

   By the presence of an aquatic host:

   a. Cyclops—guineaworm, fish tapeworm
   b. Snail—schistosomiasis.

2. ***Chemical***: The chemical pollutants include detergents, solvents, cyanides, heavy metals, minerals, organic acids, nitrogenous substances, bleaching agents, dyes, pigments, sulfides, ammonia and toxic organic substances.

f. Burial

This method is suitable for small camps. A trench 1.5 m wide and 2 m deep is excavated and at the end of each day the refuse is covered with 20 to 30 cm of earth. When the level in the trench is 40 cm from ground level, the trench is filled with earth and compacted, and a new trench is dug out. The contents may be taken out after 4 to 6 months and used on the fields.

BIOMEDICAL WASTE MANAGEMENT IN INDIA 2011

The Gazette of India: Extraordinary Ministry of Environment and Forest notification dated 24th august 2011, issued in New Delhi amendments in biomedical waste rules (1998). Table 3.3 shows categories of BWM.

Table 3.4 shows colour coding and type of container for BWM (note that colour used for tabulation of schedule has been done in accordance with the colour of container to be used).

Table 3.3: Categories of BWM

Category	*Waste type*	*Treatment/disposal*
1.	Human anatomical waste (tissues, organ, body parts)	Incineration
2.	Animal waste	Incineration
3.	Micorbiology, biotechnology and other laboratory waste	Disinfection at source by chemical treatment or autoclaving/microwaving followed by mutilation/shredding Final disposal of above by secured landfill or dis-posal of disposable waste by authorised cycles
4.	Waste sharps (needle, syringes, blade, scalpel) *Note*: Glass syringes with fixed needle come in this category and disposable syringe with needle removed in category 7	Disinfection by chemical treatment or destruction by needle cutters Autoclaving/microwaving followed by multilation/shredding Final disposal of above by secured landfill or in designated concrete waste sharp pit
5.	Discarded medicine/cytotoxic drugs	Discarded in secured landfill/incineration
6.	Solid waste (items contaminated with body and blood fluids such as cotton, dressings, linen, soiled pops, beddings	Incineration
7.	Infectious solid waste (tubings, i.v. set, gloves, saline bottle, catheter)	Disinfection by chemicals/autoclaving/microwaving followed by mutilation/shredding Then finally sent for recycling
8.	Chemical waste (chemicals used in production of biological/used in disinfection)	Chemical treatment and discharge into drains, solid into secured landfills

Table 3.4: Colour coding and type of container used for disposal of biomedical waste

Colour coding	*Type of container to be used*	*Waste category no*	*Treatment option*
Yellow	Non-chlorinated plastic bags	1, 2, 5, 6	Incineration
Red	Non-chlorinated plastic bags/ puncture proof container	3, 4, 7	As per Table 3.3
Blue	Non-chlorinated plastic bags	8	As per Table 3.3
Black	Non-chlorinated plastic bags	Municipal waste	Municipal dump site

Contents