Introduction to Public Health
BPH, First Year, First Semester
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Course Objectives:
To clarify the students of history, development and application of public health, at the completion of the course students will be competent to

- Describe the history, concept, definition, scope and limitation of public health
- Educate the students on major public health problems existing in Nepal


Unit I: Public Health

Definition of Public Health

Public health is the science and art of preventing disease, prolonging life and promoting health and efficiency through organized community effort for;

a. The sanitation of the environment,
b. Control of communicable diseases,
c. Education of the individual in personal hygiene,
d. Medical and nursing services for early diagnosis,
e. To ensure adequate living standard of everyone for the maintenance of health.

Public health is a multidisciplinary science

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Different terms of Public Health

Preventive Medicine

- Preventive medicine is a part of public health and not a substitution to it.
- It is a science and art of health promotion, disease prevention, disability limitation and rehabilitation.
- Its objective is to prevent causative agents from its transmission and thereby halting the disease process.
Community Health

- The term community health in some countries has replaced the terms public health, preventive medicine and social medicine.
- It involves motivating individuals and groups to change patterns of behavior as to take such action, including seeking of medical care, as would enable them to achieve optimum health.
- It is used as synonym for environmental health.

Social Medicine

- It is the study of man as the social being in his total environment.
- Its focus is on the health of society as a whole.
- It stresses the importance of social factors in the etiology of a disease.
- It plays a major role in developing epidemiological methods and their application to the investigation of a disease.
- Therapy consists of social and political actions for the betterment of conditions of life of a man.

Community Medicine

- It is the field concentrated on the study of health and disease in the population of defined community or group.
- Its goal is to identify the health problems and needs of defined population, and to plan, implement, and evaluate the extent to which health measures effectively meet these needs.
- The practice of community medicine is concerned with group or population rather than individual patient.

Curative/Clinical Medicine

- Clinical medicine is basic science oriented e.g. Chemistry, biology and pharmacology etc. and circles in periphery of it.
- It deals with patients in which a physician diagnosis the disease of a patient and prescribes medicine and keeps the patient in follow-up care.
- Its primary objectives are:
  - Removal of disease from patient rather than from mass
  - Treatment of disease by the use of drug which produces a reaction that itself neutralizes diseases.
Present form of Public Health

Public Health in its present form is the combination of

- Epidemiology
- Social Sciences
- Health Education
- Medical Sciences
- Demography
- Biostatistics

- Epidemiological Investigation
- Planning and management
- Intervention
- Surveillance
- Evaluation
**Historical development of Public Health from global to Nepalese context**

**Disease Control Phase (1880-1920)**
- Sanitary legislation and sanitary condition reformed
- Garbage, refuse and sewage disposal
- Supply of safe drinking water
- Disease and death control

Gives positive result i.e. improved the health of people

**Health Promotional Phase (1920-1960)**

Initiated as:
- Personal health services
- Maternal and child health services
- School health services
- Industrial health services
- Mental and rehabilitation services
Community development to promote village development through active participation of whole community because it has long-lasting effect.

**Social Engineering Phase (1960-1980)**

- Concept of ‘Risk Factors’ as determinants of communicable diseases came into existence
- Consequences of these disease was to place a chronic burden on society
- These problems brought new challenges to public health
- Needed reorientation towards social objectives
- Public Health thus moved to preventive rehabilitative aspects of chronic disease and behavioral problems


- Health gap between rich and poor within countries and between countries should be narrowed and ultimately eliminated
- Concluded that the neglect 80% of world’s population to
  - Have an equal claim to health
  - Protect from killer diseases of childhood (ARI, measles, jaundice, pneumonia)
  - Primary health care for mothers and children
- Who had an ambitious target
  - To provide health for all by the year 2000 i.e. attainments of a level of health that will permit all people to lead socially and economically productive life
Historical Development of Public Health in Nepal

The history of Public Health can be best described on the basis of Health Care Delivery System (HCDS). HCDS determines how the people are receiving health care. It is classified into two groups.

a. Traditional HCDS
b. Modern HCDS

Traditional HCDS

- Comprises of those services that have been started from ancient time and so their importance cannot be forgotten
- May not have scientific reasons behind its treatment therapy
Modern HCDS

Rana regime which started from 1846 AD and ruled for 104 years is remembered as crucial period in the history of Nepal. Jung Bahadur Rana was follower of Ayurveda. After his visit of UK, he tried to flourish modern medicine. He brought a program to immunize Rana family in 1980 AD (beginning of western medicine in Nepal). Started preventive and curative medicine with the establishment of Bir Hospital in 1890 AD and other hospital like leprosarium in Tokha, Transmitted disease hospital in Teku etc. Also started vaccination of smallpox for the preventive purpose. In 1953 AD, Department of Health Services was established with the responsibilities of promotion, regulation and management of hospital and traditional health system. Nepal government started with five years development plan (1956-1961). During that period it paid to establish more institutions for providing preventive, curative service to public. It started with preventive health program in the form of vector borne disease control units, preventive units were established, malaria eradication project in 1958 AD, tuberculosis control program in 1965, leprosy control program in 1964 AD, and smallpox eradication program in 1965 was taken with the help of WHO, and other foreign countries. Family planning and maternal and child health project was started in 1961. Health Education Unit was established in 1961. In 1978, government started integrating health services for the benefit of people. ‘Health for all’ program by 2000 AD was the slogan of WHO. In 1991, multiparty democracy was established in Nepal and developed health policy to further strengthen the primary health care to make services available to every citizen. In 1993, services of health organize directorial general of health services to implement, monitor, supervise, and evaluate the health services in the country. Regional health directorates, district health services, primary health center, health post, sub health post and volunteer services were established to provide preventive, curative, promotive and rehabilitative services to implement health plans.
History of Public Health

- Birth of Public Health concept in England around 1840.
- An English epidemiologist John Snow studied the epidemiology of cholera in London from 1848 to 1854 and established the role of drinking water in the spread of cholera.
- Cholera which is often called the father of Public Health appeared from time and again in the western world during the 10th century.
- In 1856, William Budd by careful observation of an outbreak of typhoid fever in the rural north of England concluded that the spread was by drinking water.
- Sanitary reform was done by Sir John Simson (1816-1904) the first medical officer of health of London.
- By the beginning of 20th century, the broad foundations of Public Health.
- Clean water, clean environment, wholesome condition of houses, control of offensive trades etc.
- Public Health made rapid strides in the western world, its progress has been slow in the developing countries such as Nepal where the main health problems continue to be those faced by the western world 100 years ago.

History of Preventive Medicine

- James Lind, a naval surgeon advocated the intake of fresh fruits and vegetables for the prevention of scurvy in 1753.
- Edward Jenner and John Hunter, discovered vaccination against smallpox in 1796.
- Preventive medicine developed as a specialty only after Louis Pasteur propagated in 1873 the ‘germ theory’ of disease followed by discovery of causative agents of Typhoid, Pneumonia, Tuberculosis, Cholera and Diphtheria.
- The later part of the 19th century was marked by such discoveries in preventive medicine as Pasteur’s anti-rabies treatment (1883), Cholera vaccine (1892), Diphtheria antitoxin (1894), anti typhoid vaccine (1898), antisepsics and disinfection (1827-1912), etc.
- Elucidating of the modes of disease transmission to control disease by specific measures such as blocking the channels of transmission e.g. quarantine, water pollution, pasteurization of milk, protection of food, proper disposal of sewage, destruction of insects and disinfection.
- The development of laboratory methods for the early detection of disease.
Concept of Diseases, Health and Being Healthy

Concept of Health (Changing concepts of Health)

I. Biomedical Concept
II. Ecological Concept
III. Psychological Concept
IV. Holistic Concept

Biomedical concept

Health has been viewed as an “absence of diseases”. If one was free from diseases, and then the person was considered healthy. It has basis in the “germ theory of disease”. The medical profession viewed the human body as a machine, disease as a consequence of the breakdown of the machine, and one of the doctor’s tasks as repair of the machine.

Ecological concept

Health is a dynamic equilibrium between man and his environment. Disease as a maladjustment of the human organism to the environment. It raises two issues; imperfect man and imperfect environment.

Psychological concept

Health is not only a biomedical phenomenon but one which is influenced by social, psychological, cultural, economics, and political factors of the people concerned.

Holistic concept

Holistic concept is synthesis of the entire above concept. It recognizes the strength of social, economic, political and environmental influences on health. It describes health as a unified and multi-dimensional process involving the well being of the whole person in the context of his environment. It implies that all aspects of society have an effect on health (in particular, agriculture, animal husbandry, food industry).
Definition of Health

*Webster Dictionary*

Health is the condition of being sound in body, mind or spirit, especially freedom from physical disease or pain.

*Oxford Dictionary*

Health is soundness of body or mind, that condition in which its functions are duly and efficiently discharged.

*WHO*

Health is the state of complete physical, mental and social well being and not merely an absence of disease or infirmity.

In recent years this statement of WHO has been amplified to include the ability to lead a socially and economically productive life and also has been added the aspect of spiritual wellbeing.

*Criticism of WHO definition of health*

WHO definition of health has been criticized as being too broad. It cannot be defined as a ‘state at all, but most be seen as a process of continuous adjustment to the changing demands of living and of the changing meaning we give it to life. It is dynamic concept. It helps people live well, work well and enjoy themselves. This condition may prevail in some individual but not in every one.

*Operational definition of health*

WHO definition of health is not an “operational” definition, i.e. it does not lend itself to direct measurement and studies of epidemiology of health have been hampered because of our inability to measure health and wellbeing directly.

A. Broad sense:

   Health can be seen as “condition or quality of the human organism expressing the adequate functioning of the organism in given conditions, genetic or environmental.”

B. Narrow sense:

   There is no obvious evidence of disease, and that a person is functioning normally. The several organs of the body are functioning adequately in themselves and in relation to one another, which implies a kind of equilibrium or homeostasis.
Dimension of health

There are four major dimensions of health included in the WHO definition of health.

1. Physical
2. Mental
3. Social
4. Spiritual

Besides these many more may be cited e.g. emotional, vocational, political, and cultural and so on.

1 Physical Health

Most obvious dimension of health, concerned with the mechanistic functioning of the body. Conceptualizes health biologically as a state in which every cell and every organ is functioning at optimum capacity and in perfect harmony with the rest of the body.

2 Mental health

It is an ability to think clearly and coherently. A state of balance between oneself and others. A co-existence between the realities of the self and that of other people and that of the environment. It deals with sound socialization in communities.

3 Social health

It refers the ability to make and maintain relationships with other people or communities. It is a quantity and quality of an individual’s interpersonal ties and the extent of involvement with community.

4 Spiritual health

It is concerned with religious beliefs and practices. It also deals with personal creeds, principles of behavior and ways of achieving peace of mind and being at peace with oneself.

5 Emotional health

It is ability to recognize the emotional i.e. fear, joy, grief and anger and practice such emotions appropriately. It also deals with coping stress, tension, depression and anxiety.
Determinants of Health

![Diagram of Determinants of Health](image)

Figure 2 Determination of Health
**Concept of disease**

*Webster*

A discomfort, a condition in which body health is seriously attacked, deranged or impaired, a departure from a state of health an alteration of human body interrupting the performance of vital functions.

*Oxford Dictionary*

A condition of the body or some part or organ of the body in which its functions are disturbed or deranged.

*Ecological point of view*

It is maladjustment of the human organism to the environment.

*Simplest definition*

Disease is just the opposite of health. That is any deviation from normal functioning or state of complete physical or mental well being.

**Distinction between disease, illness and sickness**

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<th>Illness</th>
<th>Sickness</th>
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<td>The term disease literally mean “without ease (uneasiness), when something is wrong with bodily function.</td>
<td>It refers to the presence of specific disease, and also to the individual’s perceptions and behavior in response to the disease, as well as the impact of that disease on the psychological environment.</td>
<td>It refers to the state of (social dysfunction), i.e. a rule that the individual assumes when ill (sickness role).</td>
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<tr>
<td>It is a physiological/ psychological dysfunction.</td>
<td>It is a subjective state of the person who feels aware of not being well.</td>
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Scope of Public Health

The scope of public health can be broadly classified as follows:

A. Those field which needs community based health services and activities
   - Supervision of food, water and milk available to the community
   - Prevention of environmental (atmospheric and stream) pollution
   - Infect and rodent control

B. Those field which deals with preventable illness, premature death and disability
   - Communicable disease including infestations
   - Malnutrition (dietary deficiencies)
   - Cancer (limitation of progression, prevention to extend possible)
   - Cardiovascular and metabolic disease (limitation of, prevention to extend possible)
   - Dental caries
   - Certain risk of maternity, child growth or development
   - Effects of addictive drugs and narcotics
   - Occupational health
   - Howe, community and industrial accidents
   - Rehabilitations of victims of injuries/accidents and disease
   - Certain mental, personality and behavioral disorders
   - Allergic manifestations and their community effect
   - Certain hereditary conditions

C. Those field of medicine, which needs organized official leadership
   - Facilitation of under and post graduate education
   - Promotion of equitable distribution of resources and facilities
   - Assistance in the development and maintenance of the quality community resources and facilities.

D. Research
   - Scientific investigation and education for the progressive and effective development of public health system.

E. Other
   - Health system
   - Health policy
   - Service delivery (affordable, accessible and adequate)
   - Social justice/equity
   - Health infrastructure
Core public health functions

- Assessment and monitoring of the health of communities and populations at risk to identify health problems and priorities.
- Formulating (recommending) public policies, in collaboration with community and government leaders, designed to solve identified local and national health problems and priorities.
- Assuring that all populations have access to appropriate and cost effective care including health promotion and disease prevention services and evaluation of the effectiveness of that care.

Six public health responsibilities

- Prevention of epidemics and spread of diseases.
- Protection of people against environmental hazards.
- Prevention of injuries.
- Promotion and encouragement of healthy behavior changes.
- Quick response to the disaster and to assist the communities in recovery phase.
- To assure quality, accessible and affordable comprehensive health care services.

Ten essential public health services

- Diagnose and investigate the health problems and health hazards in the community.
- Mobilize community partnerships.
- Develop policies and plans that support individuals and community health efforts.
- Inform, educate and empower people about health issues.
- Monitor health status to identify the community health problems.
- Enforce laws and regulations that protect health and ensure safety.
- Monitoring and evaluation of population based health care services.
- Operational research to find out innovative solution to the health problems.
- Assured competent public health and personnel health care work force.
- Link people to needed personnel health services and assure the provision of comprehensive health care when otherwise unavailable.
**Preventive health and level of prevention**

**Introduction of Primary Health Care**
Primary health care is essential health care made universally accessible to individual and families in the community by those means which are acceptable to them, through their full participation, and at a cost that the community and country can afford.

**Elements or Components of Primary Health Care**
- i. Education
- ii. Promotion of food supply and proper nutrition
- iii. An adequate supply of safe drinking water and basic sanitation
- iv. Maternal and child health care including family planning
- v. Immunization against major infectious diseases
- vi. Prevention and control of locally endemic diseases
- vii. Treatment of local/common diseases and injuries
- viii. Provision of essential drugs

**Principles of Primary Health Care**
- Equitable Distribution
- Community Participation
- Inter-sectoral Coordination
- Appropriate Technology

**Equitable Distribution**
- Universal Accessibility and coverage as per need
- PHC aims at correcting the imbalance(service accessible system) and brings health service nearer to people
- Supported by a higher level of health care to which the patients can be treated.
Community Participation

- Without participation of community and individual involvement we cannot provide health services to the people of the country so people should participate in the planning, implementation and maintenance of health service
- This participation is not only desirable, but also a social, economic, and technical necessary

Inter-sectoral Coordination

- One of the basic possibilities of PHC is that full health cannot be attained by the health sector alone
- Requires joint efforts of the health sector and other health-related sectors such as irrigation, communication, transportation, agriculture, and water supply can also contribute to promote the health status of the community

Appropriate Technology

- Appropriate technology is not cheap and primitive technology for the poor and the primitive people
- Instead, it calls for scientifically sound and socially acceptable methods
- E.g. is domiciliary treatment of TB as against sanatorium treatment.
Natural history of disease

It refers to the course of the disease over a period of time, unaffected by treatment. Occurrence of a disease is usually insidious (developing gradually with harmful effects). The history and the time period over which it is spread is different for different diseases.
**Stage of susceptibility**

In this stage a person is exposed to the risk factor for the reasonable period of time which is essential for developing the disease. E.g. obesity makes a man susceptible to hypertension, diabetes, coronary heart disease. During this stage, person remains free of the clinical disease.

**Stage of subclinical disease/pre-pathogenesis**

In this stage, three factors; agent, host and environment interact to initiate the pathogenic changes, essential for disease to occur. Even at this phase, disease remains occult. E.g. atherosclerosis changes in coronary vessels prior to actual disease.

**Stage of Clinical disease/Pathogenesis**

In this stage, the particular signs and symptoms of disease appear.

**Stage of Stage of recovery, disability or death**

The final of disease may follow any of the following trends.

1. Recovery
2. Disability
3. Death
Levels of prevention

Level of prevention can be best achieved by interfering in the natural history of the disease at an appropriate time.

1. Primordial Prevention
2. Primary Prevention
3. Secondary Prevention
4. Tertiary Prevention

Primordial prevention

Definition:
It is the real prevention which does not allow the people to fall sick. It is also a strategy to reduce risks and promote healthy lifestyles.

Phase of disease:
Underlying condition leading to causation

Focus:
The focus of primordial prevention is healthy population, healthy cities, town and villages, health homes and healthy environment.

Aim:
The aim of primordial prevention is to prevent the emergency of “unhealthy lifestyles” in population or to prevent the emergence of risk factors in the community.

Modes of intervention:
Individual and mass education

Primary prevention

Definition:
Intervention done in the stage of susceptibility results in the inhibition of the disease before its development is known as primary prevention.

Phase of disease:
Specific causal factors
Focus:-
Risk factors and causes of disease control

Aim:-

- Prevent the development of disease in population, by modification of risk factors.
- Promote general health

Modes of intervention:-

i. Health promotion
   - Health education
   - Environmental modification
   - Nutritional intervention
   - Lifestyle and behavior change

ii. Specific protection
   - Immunization
   - Specific nutrients
   - Chemoprophylaxis
   - Environmental sanitation
   - Protection against occupational hazards
   - Protection from carcinogens
   - Avoidance of allergens

Secondary prevention

Definition:-
Intervention done at early stage of disease to arrest, slow down or halt the progress of the disease is called secondary prevention.

Phase of disease:-

Early stage of disease

Focus:-
Directed in those individuals who have developed disease

Aim:-
Reduce prevalence of disease in the community
Modes of intervention:

i. Early diagnosis and treatment

E.g. Detection of malaria by active fever surveillance offers prompt treatment in homes

Tertiary prevention

Definition:

Intervention done at a late stage (at a stage of clinical disease or disability) is called tertiary prevention which results in prevention of death or handicaps. It is the last level of prevention and indicates that the first three levels have failed.

Phase of disease:

Late stage of disease

Focus:

Those individuals who have reached an advance stage of disease.

Aim:

- Reduce the progress and development of complications of established disease
- Reduce impairment and disability
- Provide rehabilitation measures
- Prolong life
- Prevent death

Modes of intervention:

i. Disability limitation

ii. Rehabilitation

It is defined as the attempt to restore an affected individual to a useful, satisfying and if possible self-sufficient role in the society. It primarily has five aspects; physical, vocational, social, medical and psychological.
Differentiate between public health, community health, community medicine and clinical medicine

Difference between public health and clinical medicine

There are some differences between public health and clinical medicine in aspects of their ways of dealing with problems, targets and basic concepts.

Some of the fundamental differences are mentioned as follows.

I. Level of intervention
   The concept of public health towards health is initiated with its bimolecular level, keeping a broad view and tries to expand its view and intervention in different levels like it serves community and finally yield healthy continent. But clinical medicine on the other hand, is trying to become specific and is forgetting the broad concepts. Clinical medicine is basic science oriented e.g. chemistry, biology, pharmacology etc and circles in periphery of it but public health goes beyond biological, physical, and chemical sciences as it deals with management issues, planning issues, economic issues including sociological issues and justices.

II. Subject of Concern
   Clinical medicine deals with a patient in which a physician diagnosis the diseases of patient and prescribes medicine and keeps the patient in follow up care. But it rarely thinks of origin of disease. Public health deals with whole population, i.e. healthy, risk group and patients.
   - Dealing with healthy people
     It is instrumental in preventing disease and promoting health.
   - Dealing with population at risk
     It recognizes at a risk groups in a population and forms the main target groups in public health. It tries to protect them from disease occurrence.
   - Dealing with patients
     It deals also with the patient in aggregation. It is concerned with drug act, rationale use of drugs, prescribing patterns, and so on.

III. Pro-active role
   Public health plays a pro-active role. It means it goes to the door of the community and tries to know the health status of people. It searches the origin of diseases. But in clinical medicine people came to the health personnel with disease.
**Difference between community medicine and social medicine**

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<td>II. Social medicine stresses the importance of social factors in the etiology of a disease and develops epidemiological methods and their application to the investigation of a disease.</td>
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<td>III. Community medicine combines with primary health care to change the state of health of the community by intervention, both at the individual and group level.</td>
<td>III. Social medicine therapy consists of social and political action for the betterment of conditions of life of a man.</td>
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**Difference between public health and community health**

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<tr>
<td>I. Public health is the science and art of preventing disease, prolonging life and promoting health and efficiency through organized community effort.</td>
<td>I. Community health refers to the healthy status of members of the community, to the problems affecting their health and to the totality of health care provided for the community</td>
</tr>
<tr>
<td>II. In practice public health components are community water supply, proper sewage disposal, good housing etc.</td>
<td>II. Its components are curative, preventive, promotive and rehabilitative services.</td>
</tr>
<tr>
<td>III. Its main objectives are to control physical environment and communicable diseases.</td>
<td>III. Its main objectives are to promote physical, mental and social well being of the people.</td>
</tr>
</tbody>
</table>
**Difference between community medicine and curative/clinical medicine**

<table>
<thead>
<tr>
<th>Community medicine</th>
<th>Clinical medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. It is preventive, promotive, curative, and rehabilitative health care.</td>
<td>I. It is treatment of disease in individual.</td>
</tr>
<tr>
<td>II. It serves the individuals and families at the community level.</td>
<td>II. It serves the individual at his personal level.</td>
</tr>
<tr>
<td>III. It is field oriented.</td>
<td>III. It is hospital oriented.</td>
</tr>
<tr>
<td>IV. Team work is extremely necessary.</td>
<td>IV. Team work is needed only in few occasions e.g. in an operation or emergency management</td>
</tr>
<tr>
<td>V. Field trials and surveys are very important.</td>
<td>V. Only clinical trial is important.</td>
</tr>
<tr>
<td>VI. Skill is very important in controlling epidemics</td>
<td>VI. Skill is necessary to tackle emergencies, e.g. in surgical or gynecology cares</td>
</tr>
<tr>
<td>VII. Monitoring conditions is poor.</td>
<td>VII. Monitoring condition is rich.</td>
</tr>
<tr>
<td>VIII. Surveillance is needed for control of disease.</td>
<td>VIII. Surveillance is not required.</td>
</tr>
</tbody>
</table>
Concept of burden of disease and role of public in controlling disease

The concept of burden of diseases was developed by World Bank and WHO. It is based on a new indicator; Disability Adjusted Life Years (DALYs) which combined Potential Years of Life Lost as a result of death at a given age and Years of Life lived with disability, using appropriate disability weight depending on the severity of illness. This index reveals the long term implication for both individual and society effectively than does the traditional approach, which looks only at death rates. It provides new insights into links between nature and extent of illness in a society on the one hand and the desirable resource allocation for health sector activities and prioritization of health care intervention on the other. It is based on the following principles:

i. It will provide best available information on the magnitude of health problems.
ii. Magnitude of health problem needs to be evaluated based on the best available evidence.
iii. Health is much more than survival. In the burden of disease approach, non-fatal health outcomes, morbidity and disability are also evaluated.
iv. Allows decision makers to focus on inequalities by revealing whether particular vulnerable groups in society have much poorer health outcomes than other.
v. The magnitude of premature mortality and disability is examined not only in terms of diseases and injuries, but also in term of risk factors.

Disability Adjusted Life Years (DALY)

DALY is the measure of the actual burden of disease in the community. It is the measure of the burden of defined population and the effectiveness of the intervention. DALY express years of life loss to premature death and year lived with disability adjusted for the severity of the disability. One DALY is one lost year of healthy life.

DALY: YLL + YLD

YLL: Years of Life Lost

YLD: Years Lost Due To Disability
Burden of disease in Nepal

i. Group I disorders (which include infectious diseases, maternal and peri-natal ailments and nutrimental deficiencies) represent 69% of National Burden of Disease.

ii. The potential threat of HIV/AIDS further acerbates the challenges in this area and demands priority attention.

iii. Group II (which includes non-communicable diseases account for 23% of the country disease burden)

iv. Group III (injuries and accidents) account for 9%.

v. More than half of the disease burden in Nepal (51%) is borne by children under 5 years.

vi. Death and illness among 15-45 years old account for nearly a quarter of DALYs lost.
Spectrum of Health/Health-Sickness Spectrum/ Spectrum of disease

Health and disease lie along a continuum, and there is no single cut off point. The lowest point on the health-disease spectrum is death and the highest point corresponds to the WHO definition of positive health. The spectral concept of health emphasizes that health is not static; it is a dynamic phenomenon and process of continuous change.

<table>
<thead>
<tr>
<th>Positive health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better health</td>
</tr>
<tr>
<td>Freedom from sickness</td>
</tr>
<tr>
<td>Unrecognized sickness</td>
</tr>
<tr>
<td>Mild sickness</td>
</tr>
<tr>
<td>Severe sickness</td>
</tr>
<tr>
<td>Death</td>
</tr>
</tbody>
</table>

Figure 4 Health sickness spectrum

The spectrum of disease is a graphic representation of variations in the manifestations of disease. It is akin to the spectrum of light where the colors vary from one end to other. At one end of the disease spectrum are subclinical infections which are not ordinarily identified, and at other end are fatal illness. In the middle of the spectrum lies illness ranging in severity from mild to severe. Leprosy is an excellent example of spectral concept of disease. In infectious disease, the spectrum of disease is also referred to as the “gradient of infection”. The sequence of events in the spectrum of disease can be interrupted by early diagnosis and treatment or by preventive measures which if introduced at a particular point will prevent or retard the further development of the disease.

Unrecognized sickness

No symptom but disease may be detected by laboratory investigation. Example includes subclinical case of HIV and polio.

Positive health

It means physically, mentally and socially optimum wellbeing.

Better health

It includes normal structure and functioning of cells, tissues, organs and body.

Freedom from sickness

It includes no normal structure or functioning of body and no evidence of disease. Example includes slight loss of weight and harmless tumor.
Iceberg of Disease

A concept closely related to spectrum of disease is the concept of the iceberg phenomenon of disease. According to this concept, disease in a community may be compared with an iceberg.

![Figure 5 Iceberg of disease](image)

The floating tip of iceberg represents what the physician sees in the community. That is clinical case. The vast submerged portion of the iceberg represents the hidden mass of disease i.e. latent, unapparent, pre-symptomatic and undiagnosed cases and carriers in the community. The waterline represents the demarcation between apparent and unapparent disease. In some diseases e.g. hypertension, diabetes, mental illness the unknown morbidity far exceeds the known morbidity. The hidden part of the iceberg thus constitutes an important, undiagnosed reservoir of infection or disease in the community and in direction and control is a challenge to modern technique in preventive medicine.
Concepts of control

Disease control

The term “disease control” describes operations aimed at reducing the incidence of disease, the duration of disease and consequently the risk of transmission, the effects of infection, including both the physical and psychological complications and the financial burden to the community.

In disease control, the disease “agent” is permitted to persist in the community at a level where it ceases to be a public health problem according to the tolerance of the local population. Here, a state of equilibrium becomes established between the disease agent, host and environment which are the components of the disease process. An excellent embodiment of this concept is malaria control which is distinct from malaria eradication.

Disease elimination

Between control and eradication, an intermediate goal has been described called “regional elimination.” The term elimination is used to describe interruption of transmission of disease. Examples include elimination of measles, polio, and diphtheria from large geographic region or areas. Regional elimination is now seen as an important precursor of eradication.

Figure 6 Disease Elimination
Disease Eradication

Eradication literally means “to tear out by roots”. Eradication of disease implies termination of all transmission of infection by extermination of the infectious agent. The word eradication is reserved to cessation of infection and disease from the whole world. It is an absolute process and not a relative goal. It is all or none phenomenon.

Monitoring

Monitoring is the performance and analysis of routine measurements aimed at detecting changes in the environment or health status of population. E.g. are monitoring of air pollution, water pollution, growth and nutritional status etc. It requires careful planning and the use of standardized procedures and methods of data collection, and can then be carried out over extended period of time by technicians and automated instrumentation.

Surveillance

It is defined as the continuous scrutiny of the factors that determines the occurrence and distribution of disease and other conditions of ill health. E.g. are epidemiological surveillance, demographic surveillance, and nutritional surveillance. It requires professional analysis and sophisticated judgments of data leading to recommendation for control activities.
Unit II: Public Health Problems in Nepal 16 hours

Vaccine Preventable Diseases

Introduction to vaccine

Vaccine is an immunebiological substance designed to produce specific protection against a given disease. It stimulates the production of protective antibody & other immune mechanism. It prepares our body to fight off the disease so quickly that we were unaware of the infections. It takes advantage of our body’s natural ability to learn how to combat many disease causing germs or microbes that attack it. Certain microbes are so powerful or virulent that they can overwhelm our body’s natural defenses. In that situation vaccine can make all the difference. In other words, vaccines trick our immune system to teach our body important lesson about how to defect by opponents.

Types of vaccines

Vaccine may be prepared from live modified organisms, inactivated or killed organisms, extracted cellular fractions, toxoids or combination of these. More recent populations are subunit vaccines and recombinant vaccine.

Live vaccine

Live vaccine (e.g. BCG, measles, oral polio) are prepared from live organisms. Those organisms have been passed repeatedly in laboratory in tissue culture and have lost their capability to induce full blown disease but retain their immunogenicity. Live vaccines must be properly stored to retain effectiveness.

Inactivated or killed vaccines

It is prepared from organisms killed by heat or chemicals. They are usually safe but generally, less efficacious than live vaccines.

Toxoids

Certain organisms produce exotoxins, e.g. diphtheria & tetanus bacilli. The toxins produced by these organisms are detoxicated & used in the preparations of vaccines. The antibodies produced neutralize the toxic substance produced during infection, rather than act upon the organisms. In general toxoid preparations are highly efficacious and safe immunizing agents. e.g. Tetanus toxoid.
Cellular fractions

Vaccines, in certain instances are prepared from extracted cellular fractions, e.g. meningococcal vaccine from the polysaccharide antigen of the cell wall, the pneumococcal vaccine from polysaccharide in the capsule of the organism & hepatitis B polypeptide vaccines.

Combinations

If more than 1 kind of immunizing agent is included in the vaccine, it is called combined vaccine. The aim of combined vaccine is to simplify administration, reduce costs & minimize the number of contacts of the patient with the health system. The followings are some of the well known combinations:

- DPT (Diphtheria- pertussis -tetanus)
- DT (Diphtheria – tetanus)
- DP (Diphtheria- pertussis)

Advantages of Vaccines

- In the last century, vaccines have saved more lives than any other health intervention. The WHO estimates that every year more than 2 million deaths are prevented worldwide due to immunization.
- Immunization is important, cost-effective and successful public health intervention. It effectively prevents disease, improves health and reduces pressure on our health care system.
- Vaccine have lead to the eradication of small pox, the most eradication of polio and the control of other disease including polio and whooping cough which once killed in large number.
- With an underlying philosophy prevention is better than cure; vaccine is much cheaper to prevent a disease than to treat it. In 2005 study in the economy impact of routine childhood
- Immunization in the US, researchers estimated that for every dollar spent the vaccination program saved more than $5 indirect cost approximately $11 in additional costs to society.
- Vaccine protects not only ourselves but also others around us that is entire communities.
- If a critical number of populations with in a community have vaccinated against a particular illness the entire group becomes less likely to get the disease.
- Cheaper, cost effective & successful public health intervention.
Disadvantages of vaccines

- It is true that no vaccine is 100% safe & effective but serious adverse reactions are rare.
- But the dangers of vaccine preventable diseases are much time greater than risks of serious adverse reactions to vaccine.

Vaccine preventable diseases

Those diseases which can be prevented by the use of vaccines are called vaccine preventable diseases. Advances in biomedical research, technology and government support for more publicly funded immunization program is helping to make this possible. Vaccine still provides the most effective longest, lasting method of preventing disease in all age groups. The vaccine preventable diseases listed below are presented with a study of the disease, information about the vaccine followed by a list of selected references.

Major targeted vaccine preventable diseases in Nepal

- Diphtheria
- Pertusis
- Tetanus
- Polio
- Measles
- Tuberculosis
- Hepatitis

Universal immunization program

In May 1947, the WHO officially launched a global immunization program, known as Expanded Program on Immunization (EPI) to protect all children of the world against 6 vaccine preventable diseases namely-diphtheria, polio, whooping cough, tetanus & measles by the year 2000. EPI was launched in India in January 1978. The program is now called Universal Child Immunization in 1990 – that’s name given to a declaration sponsored by UNICEF as part of the United Nations 40th anniversary in October 1985. It is aimed at adding impetus to the global program of EPI. The national health policy aimed at achieving universal immunization coverage of the eligible population by 1990.
## Table 2 Immunization schedule

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age group</th>
<th>Dose</th>
<th>Route</th>
<th>Site</th>
<th>No. of doses</th>
<th>internal</th>
<th>Protects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BCG</strong></td>
<td>0-1yrs.</td>
<td>0.05ml</td>
<td>ID</td>
<td>R.Upper arm</td>
<td>1</td>
<td>---</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td><strong>DPT+ HEP B</strong></td>
<td>6weeks-1yrs.</td>
<td>0.5ml</td>
<td>IM</td>
<td>L.Thigh quadriceps muscles</td>
<td>3</td>
<td>6wks-1st, 10wks-2nd, 14wks-3rd</td>
<td>Diphtheria, Pertussis, Tetanus, Hepatitis</td>
</tr>
<tr>
<td><strong>Polio</strong></td>
<td>6weeks-1yrs.</td>
<td>2-3 drops oral</td>
<td>mouth</td>
<td>3</td>
<td>6wks-1st, 10wks-2nd, 14wks-3rd</td>
<td>Poliomyelitis</td>
<td></td>
</tr>
<tr>
<td><strong>Measles</strong></td>
<td>10-12months</td>
<td>0.5ml</td>
<td>S.C</td>
<td>R.thigh</td>
<td>1</td>
<td>9 months</td>
<td>Measles</td>
</tr>
<tr>
<td><strong>T.T</strong></td>
<td>15-45yrs.</td>
<td>0.5ml</td>
<td>IM</td>
<td>L.Arm deltoid or gluteus</td>
<td>5</td>
<td>0,1m,6m,1yr,5yr</td>
<td>Tetanus</td>
</tr>
</tbody>
</table>
Diphtheria

Diphtheria is an acute infectious disease caused by toxigenic strains of *corynebacterium diphtheriae*. It remains an important cause of illness in many parts of developing countries but it is eradicated from developed countries by mass vaccination in mid 20th century. Recent outbreaks have occurred have occurred in the former “soviet union” & continuity to occur in Southeast Asia.

**Epidemiological determinants**

*Agent factors*

*Corynebacterium diphtheria*, a gram+ve & non motile bacillus.

*Source of infection*

Secretions & discharge from an infected person or carrier.

*Reservoir*

Humans, harboring the infection asymptomatically in the respiratory tract as chief reservoir.

*Infective material*

Nasopharyngeal secretion, discharge from skin lesions, contaminated fomites & possibly infected dust.

*Period of infectivity*

Unless treated, the period may vary from 2-4 weeks from the onset of disease but carriers may remain infective for much longer periods.

*Environmental factor*

Cases of diphtheria occur in all seasons although winter months favor its spreads.

*Host factor*

Mostly children aged 1-5 yrs both males & females.

*Mode of transmission*

Usually spread by droplet infection by carriers, infected cutaneous lesions.

*Incubation period*

2-6 days, occasionally longer.
Clinical features

- Nasal block\discharge, sore throat, difficulty in swallowing, low grade fever.
- Pharyngo tonsilar—neck swelling.
- Hoarseness of voice, croupy cough.
- Respiratory arrest-cyanosis, dyspnoea, tachycardia.
- Prevention
- Early detection.
- Isolation and start treatment as soon as possible.
- Immunization against diphtheria: DPT
- Give one course antibiotic to those who came in close contact to the patient.
- Disposal of infected materials safely.
- Health education.
- Immunization schedule
Pertusis

Pertusis is also known as whooping cough. It is highly contagious bacterial disease caused by *Bordetella pertussis*. There are 30-50 million cases per year in the world and about 3 million deaths per year due to pertusis. Out of them 90% of all cases occur in developing countries. The diseases were recognizable, described as early as 1578 and its causative organism was isolated in 1906 by Jules Bordet and Octave Gengou.

Epidemiological determinants

Agent factors

*Bordetella pertussis* (95%)
*B.*Parapertusis* (5%)

Source of infection

Infected man

Host factor

Age

Under 5 years (usually)

Sex

Females>males

Environmental factors

- More cases occur during winter and spring season.
- Risk of exposure in lower social classes due to overcrowded condition.

Mode of transmission

- Droplet infection.
- Direct contact.

Incubation period

Usually 7-14 days but not more than 3 weeks.
Clinical features

- Running nose.
- Moderate fever.
- Severe repeated coughs.
- Difficulty in breathing.
- Short loss of consciousness.

Control

- Early diagnosis, isolation and treatment of cases.
- Safe disposal of infected materials.

Prevention

- Health education.
- Vaccine promotion (recommended vaccine schedule of DPT)
Poliomyelitis

It is infectious viral disease of the gray matter of the central nervous system with temporary or permanent paralysis. Its causative organism is RNA virus or Polio virus.

Epidemiological determinants

Agent factor

Polio virus serotypes, 1, 2 & 3.

Reservoir of infection

Man is the only known reservoir of infection.

Infectious materials

The virus is found in the faeces and oropharyngeal secretions of an infected person.

Period of communicability

The cases are most infectious 7 to 10 days before and after onset of symptoms. In the faeces, the virus is excreted commonly for 2 and 3 weeks, some times as long as 3 to 4 months.

Age

Occurs in all age groups. Children are usually more susceptible than adults because of the acquired immunity of the adult population.

Sex

Sex differences have been noted in the ratio of 3 males to 1 female.

Risk factor

Risk factor has been found to precipitate an attack of paralytic polio in individuals already infected with polio virus. They included fatigue, trauma, intramuscular injections, operative procedures such as tonsillectomy under especially during epidemics of polio and administration of immunizing agents particularly alum-containing DPT.

Environmental factors

- Polio is more likely to occur during the rainy season.
- The environmental sources of infection are contaminated water, food and flies.
- Overcrowding and poor sanitation provide opportunities for exposure to infection.
Mode of infection

- Faecal-oral route
  The infection may spread directly through contaminated fingers where hygiene is poor of indirectly through contaminated water, milk, food and articles if daily use.

- Droplet infection
  This may occur in the acute phase if disease when the virus occurs in the throat. Close personal contact with an infected person facilitates droplet spread.

Incubation period

Usually 7 to 14 days

Clinical Features

1. Sub clinical infection
   - Occur approximately in 91-96%.
   - There are no presenting symptoms.
   - Recognition only by virus isolation.

2. Abortive polio or minor illness
   - Occur approximately 4-8%.
   - Mild or self-limiting illness, due to viraemia.

3. Non-paralytic polio
   - Occur approximately 1%.
   - Stiffness and pain in the back and neck.

4. Paralytic polio
   - Occur in less than 1%.
   - The virus invades CNS & causes varying degree of paralysis.

Associated symptoms

- Malaise, anorexia, nausea, vomiting, headache, sore throat, constipation and abdominal pain
- Might be sign of meningeal irritation.

Tripod sign

- Difficulty in sitting and sits by supporting hands at the back & by partially flexing the hips and knee.
Prevention

- Immunization is the sole effective means of preventing poliomyelitis.
- Two types of vaccines are used throughout the world; they are:
  - Inactivated (Salk) polio vaccine (IPV)
    - Contains all three types of poliovirus (20, 2 & 4 D) antigen units of types 1, 2 & 3 respectively.
    - Modified & improved IPV has containing 40-8-32 D.
    - The primary or initial course of immunization consists of 4 inoculations.
    - The first 3 doses are given at intervals of 1-2 months and 4th dose 6-12 months after the 3rd dose.
    - 1st dose is usually given when the infant is 6 weeks old.
  - Oral (Sabin) polio vaccine (OPV)
    - It contain live attenuated virus (type 1, 2 & 3)
    - The WHO programme on Immunization (EPI) recommended a primary course of 3 doses of OPV at one-month intervals
    - 1st dose when infant is 6 weeks old.
    - A dose of OPV (0 dose) is required to be given to all children delivered if health institution before their discharge from hospital.
    - One booster dose of OPV is recommended 12 to 18 months.
Measles

Highly infectious virus disease that tends to appear in epidemics every 2-3 years and mainly affects children. Rubella means Red spots. Its causative organism is *Myxovirus*.

**Epidemiological determinants**

*Agent factors*

An RNA paramxovirus

*Source of infection*

Only source of infection is a case of measles. Carries are not known to occur.

*Infective materials*

Secretion of nose, throat and respiratory tract of a case of measles during the prodromal period and early stage of the rash.

*Communicability*

The period of communicability is approximately 4 days before and after 5 days after the appearance of the rash.

*Secondary attack*

There is only one antigenic types of measles virus. Infection confers life long immunity. Most so-called secondary attack represents errors in diagnosis in initial of second illness.

*Age*

Between 6 months and 3 years of age in developing countries, usually over 5 years in developed countries.

*Sex*

Incidence equally.

*Immunity*

No age is immune if there was no previous immunity; one attack of measles generally confers life-long immunity. Second attack is rare.
Nutrition

It tends to be very severe in the malnourished child carrying mortality up to 400 times higher than in well nourished child having measles.

Environmental factor

Given a chance, the virus can spread in any season. In temperate climates, measles in a winter disease, probably because people crowd together indoor.

Transmission

Transmission occurs directly from person to person mainly by droplet infection and droplet nuclei from 4 days before onset of rash until 5 days thereafter.

Incubation period

10-12 days

Clinical features

1. Prodromal stage
   - Begins 10 days after infection and lasts until day 14.
   - Fever
   - Coryza with sneezing & nasal discharge
   - Cough
   - Redness of the eyes
   - Lacrimation
   - Often photophobia
   - Also vomiting & diarrhoea
   - Appearance of the rash Koplik’s spots appear

2. Eruptive stage
   - Typical, dusky-red macular of maculo-papular rash.

3. Post-measles
   - Lost weight & will remain weak for a number of days.
   - There may be failure to recovery & diarrhoea, pyogenic infections, candidosis, reactivation pulmonary tuberculosis.

Prevention

- Prevented by only live attenuated vaccines
- 0.5ml subcutaneous at 9 months of age complete.
- During an epidemic only immunize children at 6 months of age and give booster at 9 months of age.
- WHO’s measles elimination strategy comprises a three part vaccination strategy i.e. catch-up, keep-up & follow-up.
Tuberculosis

TB is a highly infectious airborne disease caused by *Mycobacterium tuberculosis*. Crowded homes and congregate settings (such as shelters, hospitals, and prisons) tend to foster transmission. Although pulmonary TB is the most common form, the disease can affect virtually any organ (for example, lymph nodes, brain, and genitals). Classical clinical manifestations include coughing (sometimes bloody), fever, and weight loss. The germ may remain dormant for years before it emerges as "active" disease. While activation of dormant infection is hard to predict, TB emerges most commonly among people with compromised immunity, such as those with malnutrition, diabetes, and HIV/AIDS infection. The disease is usually chronic with varying clinical manifestations. The diseases also affect animals like cattle: which is known as “bovine tuberculosis” which may sometimes be communicated to man. Pulmonary TB, the most important form of TB which affects man, will be considered here.

Nepal context to Tuberculosis

In the mountain kingdom of Nepal -- one of the poorest countries in the world -- almost half of the over 20 million population (45%) is infected with TB. Of these, 60% are adults & up to 90 000 people have active TB and there are 44 000 new cases of the disease every year.

Yet today, following a rapid expansion in access to DOTS, the Government of Nepal is succeeding in preventing thousands of TB deaths a year. The number of people dying from TB has plummeted from an estimated 15 000-18 000 in 1994 to about 8000-11000 today.

Epidemiological Determinants

**Agent factor**

**Agent**

* M. tuberculosis (*m.common*)
* M. bovis (*in animals, rare in man*)

**Source of infection**

- Human source: infected person
- Bovine source: infected milk

**Host factor**

**Age**

Affects all age mostly young and middle aged adults.

**Sex**

More prevalent to males
Heredity

Not hereditary disease but study has shown that inherited susceptibility is an important risk factor.

Nutrition

Malnutrition

Immunity

Immunocompromised are mostly at risk.

Mode of transmission

- Droplet infection: coughing, sneezing.
- Ingestion of infected material.
- Direct contact with carriers.

Incubation period

- The time from receipt of infection to the development of a positive tuberculin test ranges from 3 to 6 weeks.
- Then after the development of disease depends upon the closeness of contact, extent of the disease and dose of infection and host parasite relationship.
- Thus the incubation period may be weeks, months or years.

Clinical feature

- Continuous coughing >2 weeks.
- Usually continuous fever at evening.
- Cough with sputum production.
- Later breathlessness & haemoptysis.
- Chest pain on long inspiration.
- Positive crepitation & pleural effusion.
- Weight loss, anorexia, sweating, weakness, anaemia and leucocytosis.

Prevention

- Health education.
- Early detection & treatment.
- Vaccination: BCG vaccine promotion
Tetanus

Tetanus, also called lockjaw, is a medical condition characterized by a prolonged contraction of skeletal muscle fibers. The primary symptoms are caused by tetanospasmin, a neurotoxin produced by the Gram-positive, obligate anaerobic bacterium Clostridium tetani. Infection generally occurs through wound contamination, and often involves a cut or deep puncture wound. As the infection progresses, muscle spasms in the jaw develop, hence the name lockjaw. This is followed by difficulty in swallowing and general muscle stiffness and spasms in other parts of the body. Infection can be prevented by proper immunization and by post-exposure prophylaxis.

Causative agent

- Clostridium tetani (Gram positive, anaerobic, heat resistance, spore forming bacteria.)
- Tetanus is the only vaccine-preventable disease that is infectious but is not contagious.

Incubation period

- The incubation period of tetanus ranges from 3 to 21 days, with an average onset of clinical presentation of symptoms in 8 days.
- In general, the further the injury site is from the central nervous system, the longer the incubation period.
- The shorter the incubation period, the higher the chance of death. In neonatal tetanus, symptoms usually appear from 4 to 14 days after birth, averaging about 7 days.

Clinical Features

- Mild to moderate fever.
- Pain & spasm in muscles of jaw, stomach, back.
- Lock jaw.
- Opisthotonus
- Risussardonicus
- Spasmodic reflex due to light, noise.
- Difficulty in breathing due to severe pain.
- Severe headache, backache & irritable patient.
- At last severe spasm of respiratory & cardiac muscle may lead to death.

Prevention and control measures

- Health education.
- Early detection, isolation and treatment.
- Vaccine promotion: DPT vaccine 0.5ml-IM—3 dose.
- Tetanus toxoid vaccine for 15-45years women, 0.5ml-IM-5 doses.
- Use of sterile equipment during any cutting or penetrating procedures.
Waterborne Diseases

Man’s health may be affected by the ingestion of contaminated water either directly or through food and by the use of contaminated water for the purpose of personal hygiene and recreation. Water borne disease are those disease which arise from the contaminated of water by human or animal feces or urine injected by pathogenic viruses or bacteria. This is directly transmitted when the water is drunk or used in the preparation of food. Developing countries carry a heavy burden of water related disease the main is the diarrhea disease.

Water related disease may be classified as follows:

Biological (water borne disease)

- Those caused by the presence of an injective agent
  - Viral: Viral hepatitis A, hepatitis E, Poliomyelitis, rotavirus, diarrhea in infants
  - Bacterial: Typhoid and paratyphoid, fever bacillary dysentery, *Esch. coli* diarrhea, cholera.
  - Protozoal : Amoebas, giardiasis
  - Helminthes: roundworm, thread worm hydatid.

- Those due to the presence of an aquatic host
  - Snail: Sc. Histosomaisis
  - Cyclops: Gueniworm (the white threadlike adult female 60-120 cm long living in connective tissue beneath the skin), fish tapeworm.

Chemical (water borne disease)

Industrial and agricultural wastes are extremely found in water source. These pollutants includes detergent solvents, cyanides, heavy metal, minerals and organic acid, bleaching agent, dyes, ammonia, toxic compounds etc. chemical pollutants may affect man’s health not only directly but also indirectly by accumulating in aquatic life like fish used as human food.

In addition, water is associated with the following:

- Some Diseases are related to the diseases carrying insects breeding in near water like: malaria, filarial. Arboviruses.
- Dental health: High level of fluoride in drinking water may cause mottling of the dental enamel.
Nepal context

- Water borne disease is a major health problem in Nepal
- Nepal has the poorest drinking water and sanitation
- Diseases are transmitted through contaminated water, several bacterial, protozoal and viral
- Water borne diseases have posed serious public health problem in Nepal,
- According to the Nepal Country Environment Analysis; diarrhea, intestinal worms, cholera, typhoid and jaundice are the top five water borne diseases in Nepal.
Hepatitis

Hepatitis is inflammation of the liver, which can be caused by viruses, medications, or toxic agents. It is usually characterized as viral hepatitis or non-viral hepatitis. Viral hepatitis can be considered "acute" (a condition that comes on rapidly with severe symptoms and a short course) or "chronic" (a condition that comes on slowly, may or may not have symptoms with has a long course) disease.

Hepatitis A

Hepatitis A refers to liver inflammation caused by infection with the hepatitis A virus (HAV). HAV is one of several viruses that does not cause chronic disease. Although the liver does become inflamed and swollen, it heals completely in most people without any long-term damage. Once you have had hepatitis A, you develop lifelong immunity and cannot get the disease again.

Epidemiology:

Agent
RNA Enterovirus

Resistance
The viral is resistance to heat and not affected by chlorination in normal doses. Destroyed by formalin, UV rays, boiling for 5 minutes & autoclaving.

Period of infectivity
2 weeks before & 1 week after jaundice

Host
It depends on endemicity

Environment
Poor sanitation & hygiene

Transmission
- Fecal – Oral Route
- Contaminated food
- Close personal contact
- Blood exposure
Incubation period

Hepatitis A is usually developed between 2 and 6 weeks after infection. The length of incubation period is proportional to the dose of virus ingested.

Symptoms

- Vomiting
- Diarrhea, especially in children
- Low-grade fever
- Loss of appetite
- Rash
- Tiredness
- Jaundice - A yellow discoloration of the skin and the whites of the eyes
- Urine is dark brownish in color, like cola or strong tea.
- Pain in area of liver - On the right side of the abdomen, just under the rib cage.

Prevention

Personal hygiene
- wash your hands before preparing or eating food
- remember to flush the toilet and wash your hands before you leave the restroom

Food hygiene
- Drink only boiled water
- All food, especially shellfish, should be thoroughly cleaned and well cooked. (The hepatitis A virus dies within five minutes at 100 °C)
- Do not contaminate cooked food with your unwashed hands or unclean water

Environmental hygiene
- handle contaminated water and sewage properly
- store your drinking water in clean and properly topped containers to avoid contamination
- keep cooking utensils and tableware clean

Treatment

Hepatitis A usually resolves on its own over several weeks.

Hepatitis A Vaccination strategy

In most developing countries hepatitis A is not a real public health priority, since it is acquired in early childhood when infections are usually asymptomatic.
Hepatitis E

The hepatitis E virus (HEV) is a common cause of hepatitis that is transmitted via the intestinal tract, and is not caused by the hepatitis A virus. It is a viral hepatitis (liver inflammation) caused by infection with a virus called hepatitis E virus and spread most often by contaminated drinking water. HEV infection occurs mainly in developing countries.

Epidemiology

- The incidence of hepatitis E is highest in adults between the ages of 15 and 40.
- It is usually "self-limited." Self-limited means that a disease usually requires no medical treatment and will eventually be healed by the body's immune system.
- It only causes acute illness means that the disease won't be chronic (like hepatitis B or C). Unlike chronic hepatitis, there is no relation to problems like cancer and cirrhosis.
- It is spread by the fecal-oral route
- It can be dangerous during pregnancy

Transmission

Fecal-oral route

Diagnosis

Laboratory diagnosis; blood test

Surveillance and control

- provision of safe drinking water and proper disposal of sanitary waste
- monitoring disease incidence
- determination of source of infection and mode of transmission by epidemiologic investigation
- detection of outbreaks
- spread containment

Vaccines

At present, no commercially available vaccines exist for the prevention of hepatitis E. However, several studies for the development of an effective vaccine against hepatitis E are in progress.

Prevention

- Control the fecal-oral route transmission
- Good personal hygiene
Treatment

Hepatitis E is a viral disease, and as such, antibiotics are of no value in the treatment of the infection. Hepatitis E usually resolves on its own over several weeks to months.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Microbial agent</th>
<th>Source of infection</th>
<th>General symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td><em>Vibrio cholera</em></td>
<td>Contaminated drinking water</td>
<td>Watery diarrhea, nausea, abdominal cramps, rapid pulse, hypovolomic shock.</td>
</tr>
<tr>
<td>E. Coli infection</td>
<td><em>E. coli</em></td>
<td>Untreated drinking water</td>
<td>Mostly diarrhea, dehydration.</td>
</tr>
<tr>
<td>Dysentery</td>
<td>Sepsis in genera <em>Shigella</em> &amp; <em>Salmonella</em> with most common being <em>Shigella dysenteries</em></td>
<td>Untreated drinking water</td>
<td>Frequent passage of feaces with blood, or mucus &amp; in some cases vomiting of blood.</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td><em>S. typhi</em></td>
<td>Ingestion of contaminated water and infected person</td>
<td>Fever up to 104(F), sweating, diarrhea, rash comes (less commonly). Symptoms progress to delirium.</td>
</tr>
</tbody>
</table>

Table 3 Bacterial Infection

<table>
<thead>
<tr>
<th>Disease transmission</th>
<th>Microbial agent</th>
<th>Source of an infection</th>
<th>General symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoebiosis (hand to mouth)</td>
<td>Protozoan <em>E. histolytica</em> cyst like stir.</td>
<td>Sewage no treated water, flies in water supply</td>
<td>Abdominal discomfort, fatigue, weight loss, diarrhea, fever</td>
</tr>
<tr>
<td>Giardiasis (oral-feecal )</td>
<td><em>Girdia lamblia</em></td>
<td>Untreated ground water</td>
<td>Diarrhea, abd. Pain, gas pain</td>
</tr>
<tr>
<td>Hand to hand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsporodiasis</td>
<td>Protozoan (phylum microsporodia but closely related to fungi)</td>
<td>Contaminated drinking water</td>
<td>Diarrhea &amp; wasting in immunocompressed individual.</td>
</tr>
</tbody>
</table>

Table 4 Protozal infection
Cholera

Cholera is an acute diarrheal disease caused by *Vibrio cholera*. Cases range from symptom less to severe infections. Typical cases are characterized by sudden onset of profuse, effortless, watery diarrhea followed by vomiting, rapid dehydration, muscular cramps and suppression of urine.

**Epidemiology**

- Cholera is both an epidemic and endemic disease.
- The epidemicity and endemicity of a disease will depend on the characteristics of the agent and that of environment.
- Cholera cause problem in areas where sanitation is defective.
- It has high potential to spread fast and cause deaths.
- The disease used to be most common in summer and also sometime in early winter.

**Agent factors**

**Agent**

*Vibrio cholerae*

**Resistance**

- 30 minutes by heating at 56°C or within a few seconds by boiling.
- By coal tar disinfection such as cresol.
- By bleaching powder: -6 mg/lit

**Toxin production**

Multiply in the lumen of small intestine and produce an exotoxin (*causes diarrhea*).

**Mode of transmission**

- Fecal contaminated water
- Contaminated food and drinks
- Direct contact
Number of cholera cases, death and case fatality rate worldwide, notified to WHO (1961-2005)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Death</th>
<th>Case fatality rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>62000</td>
<td>30560</td>
<td>49.3</td>
</tr>
<tr>
<td>1971</td>
<td>176000</td>
<td>26048</td>
<td>14.8</td>
</tr>
<tr>
<td>1981</td>
<td>51000</td>
<td>2448</td>
<td>4.8</td>
</tr>
<tr>
<td>1991</td>
<td>595000</td>
<td>19040</td>
<td>3.2</td>
</tr>
<tr>
<td>2000</td>
<td>137000</td>
<td>4908</td>
<td>3.6</td>
</tr>
<tr>
<td>2003</td>
<td>112000</td>
<td>1894</td>
<td>1.69</td>
</tr>
<tr>
<td>2005</td>
<td>131000</td>
<td>2272</td>
<td>1.72</td>
</tr>
</tbody>
</table>

Table 5 Number of cholera cases, death and case fatality rate worldwide, notified to WHO (1961-2005)

**Incubation period**

Few hours to 5 days but commonly 1-2 days

**Clinical features**

Based on three stages of the disease:-

- **Stage of evacuation**: There is profuse, painless watery diarrhea “Rice water stool”.
- **Stage of collapse**: vomiting, rapid dehydration- shrunken eyes, low BP, muscular cramps suppression of urine.
- **Stage of recovery**: The case fatality rate is as high as 30-40% if not treated, others recover.

**Control**

- Verification of the diagnosis as quickly as possible.
- Notification
- Early case finding
- Establishment OF treatment centers
- Rehydration therapy:
  - Oral rehydration
  - Intravenous rehydration
- Sanitation measures:
  - water control
  - excreta disposal
  - food sanitation
  - disinfection
**Oral Rehydration Therapy**

To prevent dehydration and reduce mortality the composition of oral rehydration fluids recommended by WHO (since January 2004) is given in the table:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity (grams/liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium chloride</td>
<td>2.6</td>
</tr>
<tr>
<td>Glucose, anhydrous</td>
<td>13.5</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>1.5</td>
</tr>
<tr>
<td>Trisodium citrate dehydrate</td>
<td>2.9</td>
</tr>
<tr>
<td>Potable water</td>
<td>1 ltr</td>
</tr>
</tbody>
</table>

Table 6 Composition of ORS

<table>
<thead>
<tr>
<th>Age</th>
<th>Under 4 months</th>
<th>4-11 months</th>
<th>1-2 yrs</th>
<th>2-4 yrs</th>
<th>5-14 yrs</th>
<th>15 yrs or over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>Under 5</td>
<td>5-7.9</td>
<td>8-10.9</td>
<td>11-15.9</td>
<td>16-29.9</td>
<td>30 or over</td>
</tr>
<tr>
<td>ORS solution (ml)</td>
<td>200-400</td>
<td>400-600</td>
<td>600-800</td>
<td>800-1200</td>
<td>1200-2200</td>
<td>2200-4000</td>
</tr>
</tbody>
</table>

Table 7 Guidelines for oral rehydration therapy (for all ages) during the first four hours
Typhoid

Typhoid fever and enteric fever are acute, generalized infections caused by *Salmonella typhi* and *Salmonella paratyphoid* respectively. Typhoid fever occurs in all parts of world where water supplies and sanitation are sub standard. Worldwide typhoid fever affects about 17 million people with more than 0.6 million deaths a year. It is most common in developing countries.

**Epidemiological determinants**

**Agent factors**

*Agent*

*S. typhi* major causes of enteric fever. *S. para A* and *S. para B* are relatively infrequent.

*Reservoir of infection*

Man is the only known reservoir of infection.

*Source of infection*

Primary sources of infection are feces and urine of cases or carriers; the secondary sources contaminated water, food, fingers and flies.

**Environmental and social factors**

The peak incidence is reported during July –September mainly in rainy season.

**Incubation period**

Usually 10-14 days, But it may be as short as 3 days or as long as 3 weeks.

**Mode of transmission**

Typhoid is transmitted via the fecal–oral route or urine oral routes.

![Figure 7 Dynamics of typhoid fever transmission](image-url)
Clinical features

At first week:

- **Fever**: Temperature rises in the step ladder fashion in 4-5 days.
- **Headache**: Specially frontal
- **Myalgia**: Aching in limbs.
- **Relative bradycardia**: Even though temperature is increased there is decreased heart rate.
- **Constipation**: diarrhoea and vomiting in children.
- **Abdominal pain**

At the end of first week and early of second week:

- rose spots on the trunk
- spleenomegaly
- cough
- abdominal distention
- diarrhea
- epitasis
- coated tongue centrally

At the end of second week and in third week:

- delirium (loss of consciousness)
- complication then coma and death if untreated.

Control

- Control of reservoir
- Control of sanitation
- Immunization
Acute diarrheal disease

Diarrhea is defined as the passage of loose, liquid of watery stools more than three times a day. Acute diarrhea as an attack of sudden onset, which usually lasts 3 to 7 days, but may last up to 10 to 14 days. Diarrhea lasting 3 weeks or more may be called chronic diarrhea.

Problem statement

WHO initiated the diarrheal diseases control program in 1980, approximately 4-16 million children were dying each year due to diarrhea.

<table>
<thead>
<tr>
<th>Region</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>707000</td>
</tr>
<tr>
<td>America</td>
<td>57000</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>259000</td>
</tr>
<tr>
<td>Europe</td>
<td>16000</td>
</tr>
<tr>
<td>South –East Asia</td>
<td>605000</td>
</tr>
<tr>
<td>Western pacific</td>
<td>15000</td>
</tr>
<tr>
<td>Total</td>
<td>1798000</td>
</tr>
</tbody>
</table>

Table 8 Estimated mortality and daily lost by WHO regions (2002)

Epidemiological determinants

Agent factors:

*Viruses*

- Rotavirus- (15-25) %, Astor-viruses.

*Bacteria*

- *Escherichia coli* (10-25) %, Bacillus cereus, *B. Shigella* (5-15) %, *Vibrio cholera* (5-10) %, *Escheria coli* (1-5) %, *Salmonella* (5-15) %

*Others*

- *E. histolytica*, Giardia intestinalis, intestinal worm.

*Protozoans*

- 5-15) %

*Non-pathogen food*

- (20-30) %

*Host factors*

- It is most common in children (between 6 to 24 months) incidence highest in 6 to 11 months, when meaning occurs. Diarrhea is more common in persons with malnutrition,
poverty, prematurity, domestic hygiene and incorrect feeding practice hygiene and incorrect feeding practice are all contributory factors.

Environmental factors
Warm season, rotavirus peak during the winter, rainy season.

Mode of transmission:
Fecal – Oral route

Control

Short term
- Appropriate clinical management.

Long term
- Better MCH (Maternal & Child Health care practices)
- Preventive strategies.
- Preventing diarrheal epidemics.

Appropriate clinical management
- Oral rehydration therapy
- Intravenous re-hydration.
- Appropriate feeding.

Better MCH care practices
- Maternal nutrition
- Child nutrition:
  - Promotion of breast feeding
  - Appropriate weaning practices.
  - Supplementary Feeding

Preventive Strategies
- Sanitation
- Health Education
- Immunization
- Fly control

Control and prevention of diarrheal epidemics
- This requires strengthening of epidemiological surveillance systems.
Protozoal disease

Amoebiasis

Amoebiasis is defined by WHO as the condition of harboring the protozoan parasite *E. histolytica* with or without clinical manifestations. It has a world-wide distribution. It is a major health problem in the whole of China, South East and West Asia and Latin America. Globally estimate that, in 1997, 45 million people carried *E. histolytica* and 70,000 deaths.

Epidemiological determinants:
Agent factors:

Agent
- *E. histolytica*

Reservoir of infection
- Man is the only reservoir of infection. The immediate source of infection is the faces containing cysts.

Host factors
- Occurs in any age

Environmental factors
- Poor sanitation

Clinical features
- Loose stool mixed with blood & mucus, vomiting, fever etc.

Incubation Period
- About 2 to 4 weeks or longer

Mode of Transmission
- Fecal-Oral route.
- Sexual transmission by oral-rectal contact
- Vectors: Flies, Cockroaches and rodents

Prevention and control
Primary Prevention:
- Sanitation
- Water supply
- Food hygiene
- Health education

Secondary Prevention:
- Early diagnosis & treatment
Prevention and control of water-borne diseases

**Primordial or primary prevention**

It aims to prevent the development of risk factors in a population. Examples: Adoption of healthy lifestyles, Community development, Health education, environmental sanitation for control of mosquito to protect against malaria. It means activities that aim to safeguard people from acquiring ill health conditions.

- **Health Education**
  Conducting community health education programmed with actively participation of community people. This strategy can be applied to promote desired change of knowledge, skills and habits among common people, health and development workers and decision makers at all levels and scale. A health education concerning pollution control should include at least:
  - Causes of water pollution
  - Effects
  - Prevention and control measures

- **Decrease the causes of water pollution**
  - Organic causes
  - Contamination – humans, cattle, wildlife
  - Disposal of liquid waste into water bodies
  - **Inorganic causes**
    Examples: Mercury, cadmium, lead, phosphorus and sulphur compounds, pesticides and fertilizers, radioactive materials, etc. Such chemicals are added into water sources (surface or ground) by industrial waste, hospital waste, and drainage from farmlands.

- **Proper maintained of water supply and sanitation.**

- **Management of sewage & waste**
  - Safe management of liquid waste
  - Domestic scale: Kitchen garden, Soakage pit, Artificial wetland
  - Municipal scale – Waste water treatment

- **Disinfection of well**
  - On a mass scale during epidemic of cholera gastroenteritis; use bleaching powder.

- **Care in disposing of feces**
  - Make a toilet far from water sources
  - Strategies like Behaviour Change Communication (BCC) may be adopted.
**Behaviour change may include:**
- Latrine construction and proper use
- Abandonment of open defecation practice

- Proper use of latrine by adult & children. After toileting wash the hand with soap.

- Improving the quality of drinking water at sources, at the tap or in the storage vessels. It involves the purification of water.

**Purification of water**

**A) Purification of water in large scale**

- Storage
- Filtration
- Disinfection

**Storage:**
- It provides a reserve of water from which further pollution is excluded.
- About 99% of the suspended impurities are settle down in 24 hours by gravity.
- The water becomes clear.

**Filtration:**
- Second stage in the purification of water.
- 98-99% of bacteria are removed.
- Filtrations are two types
  1. **Biological or slow sand filter:**
     Water is filter by the use of sand bed. It consists of mechanical straining, sedimentation, adsorption, and oxidation.
  2. **Rapid sand or mechanical filter**

![Figure 8 Rapid sand or mechanical filter](image-url)
Disinfection:
- Chlorination: kills pathogenic bacteria.
- Other agent: ozonation (ozone gas); virucidal, ultra violet radiation.

B) Purification of water at household level
- Boiling:
  Boiling for 5-10 minutes kills all bacteria, spores, cysts & ova.
- Filtration:
  It is very cheap and useful method. Commonly porcelain candle is used in filter.
- Chemical disinfection:
  E.g. bleaching powder, chlorine tablet, iodine, potassium per magnet

Secondary prevention

Aims are to stop the progress of disease and prevent complications. Principal approaches are early diagnosis of illnesses and prompt treatment. This level of prevention combines epidemiological and curative approaches of health care.
- Interruption of the routes of transmission of diseases (epidemic in community)

![Figure 9 Routes of transmission of diseases](image)

- Immunization against various water-borne diseases for e.g. typhoid (anti-typhoid vaccine), cholera (paranetal vaccine).
- Early diagnosis & treatment:
  - Symptomatic cases: All the health center level symptomatic cases of various diseases can be treated effectively.
  - Asymptomatic infections: In an endemic area.
- Epidemiological investigation:
  To define the extend of outbreak and identify the modes of transmission so that more effective & specific control measure can be applied.
• Chemoprophylaxis:-
  For e.g. in case of cholera tetracycline is the drug of choice for chemoprophylaxis.

*Tertiary prevention*

Decrease the long effect of different water born diseases & problems.

**Government of Nepal followed the following method for control of diseases (mechanism of disease control)**

1. Notification: - If infectious disease has been detected, it should be notified to the local health authority.
2. Epidemiological investigation: - Identification of source of infection & of the factor infusing its spread in the community.
3. Sample collection and treatment
4. Treatment of sources and reservoir
5. Immunization
6. Interruptions of transmission
7. Surveillance
Communicable Diseases

An illness due to a specific infectious agent or its toxic products capable of being directly or indirectly transmitted from man to man, animal to animal, or from the environment (through air, dust, soil, water, food, etc.) to man or animal is called communicable disease.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cause of death</th>
<th>Deaths 2002</th>
<th>Percentage of all deaths</th>
<th>Deaths 1993</th>
<th>1993 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>All infectious diseases</td>
<td>14.7 million</td>
<td>25.9%</td>
<td>16.4 million</td>
<td>32.2%</td>
</tr>
<tr>
<td>1</td>
<td>Lower respiratory infections</td>
<td>3.9 million</td>
<td>6.9%</td>
<td>4.1 million</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>HIV/AIDS</td>
<td>2.8 million</td>
<td>4.9%</td>
<td>0.7 million</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Diarrheal diseases</td>
<td>1.8 million</td>
<td>3.2%</td>
<td>3.0 million</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Tuberculosis</td>
<td>1.6 million</td>
<td>2.7%</td>
<td>2.7 million</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Malaria</td>
<td>1.3 million</td>
<td>2.2%</td>
<td>2.0 million</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Measles</td>
<td>0.6 million</td>
<td>1.1%</td>
<td>1.1 million</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Pertussis</td>
<td>0.29 million</td>
<td>0.5%</td>
<td>0.36 million</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Tetanus</td>
<td>0.21 million</td>
<td>0.4%</td>
<td>0.15 million</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>Meningitis</td>
<td>0.17 million</td>
<td>0.3%</td>
<td>0.25 million</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>Syphilis</td>
<td>0.16 million</td>
<td>0.3%</td>
<td>0.19 million</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>Hepatitis B</td>
<td>0.10 million</td>
<td>0.2%</td>
<td>0.93 million</td>
<td>6</td>
</tr>
<tr>
<td>12-17</td>
<td>Tropical diseases</td>
<td>0.13 million</td>
<td>0.2%</td>
<td>0.53 million</td>
<td>9, 10, 16-18</td>
</tr>
</tbody>
</table>

Note: Other causes of death include maternal and perinatal conditions (5.2%), nutritional deficiencies (0.9%), non-communicable conditions (58.8%), and injuries (9.1%).

Table 9 Worldwide mortality due to infectious diseases
Nepalese scenario

<table>
<thead>
<tr>
<th>Diseases</th>
<th>National Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Diseases</td>
<td>5.51</td>
</tr>
<tr>
<td>Diarrhoeal Diseases (CDD)</td>
<td>3.35</td>
</tr>
<tr>
<td>Acute Respiratory Infection</td>
<td>3.13</td>
</tr>
<tr>
<td>Intestinal worms</td>
<td>2.82</td>
</tr>
<tr>
<td>Pyrexia of unknown origin</td>
<td>2.02</td>
</tr>
<tr>
<td>Gastritis</td>
<td>1.95</td>
</tr>
<tr>
<td>Ear Infection</td>
<td>1.40</td>
</tr>
<tr>
<td>Chronic Bronchitis</td>
<td>1.06</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>0.96</td>
</tr>
<tr>
<td>Sore Eye and Complaints</td>
<td>0.93</td>
</tr>
</tbody>
</table>

**Acute Respiratory Infection (ARI) and Fever (%) * **

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with symptoms of ARI</td>
<td>22.8</td>
</tr>
<tr>
<td>Children with fever</td>
<td>32.0</td>
</tr>
<tr>
<td>Children with symptoms of ARI</td>
<td>24.2</td>
</tr>
<tr>
<td>(sought treatment from a health facility or provider)</td>
<td></td>
</tr>
</tbody>
</table>

**Diarrhea (%) * **

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two weeks preceding the survey</td>
<td>20.4</td>
</tr>
<tr>
<td>Percentage of clients taken to a health care provider</td>
<td>21.8</td>
</tr>
</tbody>
</table>

*Table 10 Top Ten Diseases Accounting for Morbidity *
### List of communicable diseases

**Respiratory infections**
- Smallpox
- Chicken pox
- Measles
- Rubella
- Mumps
- Influenza
- Diphtheria
- Whooping cough
- Meningococcal meningitis
- ARI
- Tuberculosis

**Intestinal infections**
- Poliomyelitis
- Viral hepatitis
- Cholera
- Diarrhea
- Typhoid fever
- Food poisoning
- Amoebiasis
- Ascarisis
- Hookworm infection
- Dracunculiasis

**Arthropod borne infections**
- Dengue
- Lymphatic Filariasis
- Malaria

**Zoonoses**
- Rabies
- Yellow fever
- Japanese encephalitis
- Brucellosis
- Leptospirosis
- Plague
- Human salmonellosis

**Parasitic Zoonosis**
- Taeniasis
- Hydatid disease
- Leishmaniasis

**Rickettsial diseases**
- Rickettsial Zoonosis
- Scrub typhus
- Murine typhus
- Tick typhus
- Q fever

**Surface infections**
- Trachoma
- Tetanus
- Leprosy
- STD
- AIDS
Tuberculosis

Tuberculosis is communicable, chronic, granulomatous disease caused by *mycobacterium Tuberculosis*.

**World problem statement**

New cases every year: 7.25 millions  
Deaths every year: 3 millions

**Nepal’s statement**

- About 45% of the population is infected with TB,  
- Every year, 44,000 people develop active TB, of whom 20,000 have infectious pulmonary disease  
- These 20,000 can spread the disease to others  
- 8,000-11,000 people continue to die every year from this disease

**Mode of transmission**

Droplet infection

**Incubation period**

3-6 weeks

**Clinical features**

- Persistent cough for about 3 or 4 weeks duration  
- Continuous fever  
- Chest pain  
- Hemoptysis  
- Weight loss

**Diagnosis**

- Chest X-ray  
- Sputum for AFB  
- Mantoux test
Direct observation treatment shortcourse (DOTS)

<table>
<thead>
<tr>
<th>TB treatment category</th>
<th>TB patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>New smear positive pulmonary TB and seriously ill smear negative pulmonary TB</td>
</tr>
<tr>
<td>II</td>
<td>Sputum smear positive Relapse, Treatment failure and return after default</td>
</tr>
<tr>
<td>III</td>
<td>Smear negative PTB and extra pulmonary TB (less severe)</td>
</tr>
</tbody>
</table>

**Category I**
- Initial : Isoniazide + Rifampicin + Pyrazinamide + Ethambutol (2 months)
- Continuation : Isoniazide + Ethambutol (6 months)

**Category II:**
- Initial :Isoniazide + Rifampicin + Pyrazinamide + Ethambutol + Streptomycin (2 months)
- Continuation : Isoniazide + Rifampicin + Ethambutol (5 months)

**Category III**
- Initial : Isoniazide + Rifampicin + Ethambutol (2 months)
- Continuation : Isoniazide + Ethambutol (6 months)

**Prevention**
- Vaccination
- Use of mask by the patient
- People with TB and their contacts are identified and then treated
- Health education
- Early diagnosis and prompt treatment

**Five pillars of DOTS**
1. Political Commitment
2. Diagnosis by microscopy
3. Uninterrupted drug supply
4. Daily Observed Therapy
5. Monitoring and supervision
Leprosy (Hansens disease)

It is a chronic infectious disease caused by *M. leprae*. It mainly affects the peripheral nerves. It also affects the skin, muscles, eyes, bones, testis and internal organs. The manifests in two polar form Lepromatous leprosy and tuberculoid leprosy.

**Agent**

*Mycobacterium leprae*

*Acid fast bacilli*

**Incubation period**

3-5 years or more for lepromatous cases

**Mode of transmission**

- Droplet infection
- Contact transmission
- Other routes e.g. transmission through breast milk of lepromatous mothers

**Clinical features**

- Hypopigmented patches
- Partial or total loss of cutaneous sensation in the affected areas
- Presence of thickened nerves

**Diagnosis**

- Clinical examination
- Bacteriological examination
  - Skin smears
  - Nasal smears
  - Nasal scrapings

**Treatment**

*Multibacillary leprosy*

- Rifampicin 600mg once monthly supervised
- Clofazimine 300mg once monthly supervised
- Dapsone 100 mg once daily self
- Treatment to be continued for 2 years

*Paucibacillary leprosy*

- Rifampicin 600mg once monthly supervised
- Dapsone 100 mg once daily self
- Treatment to be continued for 6 months
Prevention

- Health education
- Screening of disease
- Early diagnosis and treatment

National leprosy control program

Objectives:

- To reduce PR to < 1 / 10,000 and continue to reduce it further.
- To prevent disabilities due to leprosy.
- To minimize social stigma of the disease

Strategies:

- Early case detection
- Timely cure of the registered cases
- Enhance community awareness on different dimension of leprosy
- Encourage community participation

Major Achievements of the program:

- Uninterrupted integrated MDT service delivery up to SHP level.
- Vast pool of trained man power.
- Excellent case holding.(>90% TCR).
- Network of referral centers.
- Community empowerment.
- Regular review meetings.

Challenges

- Dependency on external support.
- Inadequate motivation of health service staff.
- Inappropriate health seeking behavior among general public.
- Ineffective and inadequate supervision.
- Immediate future needs of NLEP
Malaria

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected mosquitoes. A child dies of malaria every 30 seconds. There were 247 million cases of malaria in 2006, causing about 880,000 deaths, mostly among African children. Malaria is preventable and curable. Approximately half of the world's population is at risk of malaria, particularly those living in lower-income countries. Travelers from malaria-free areas to disease "hot spots" are especially vulnerable to the disease. Malaria takes an economic toll - cutting economic growth rates by as much as 1.3% in countries with high disease rates. Malaria is caused by parasites of the species *Plasmodium*. The parasites are spread to people through the bites of infected mosquitoes.

There are four types of human malaria:

1. *Plasmodium falciparum*
2. *Plasmodium vivax*
3. *Plasmodium malariae*

*Plasmodium falciparum* and *Plasmodium vivax* are the most common. *Plasmodium falciparum* is the most deadly.

Problem statement Nepal

![DISTRIBUTION OF MALARIA IN NEPAL](image-url)
Agent
P. vivax, P. falciparum, P. malariae, P. ovale

Vector of malaria
Female anopheles mosquito

Mode of transmission
- Vector transmission - mosquitoes
- Direct transmission - e.g. blood transfusion
- Congenital malaria

Incubation period
10 days

Clinical features

*Plasmodium vivax* and *P. ovale* malaria
- Classical bouts of fever on alternate days
- Fever with a rigor; the patient feels cold and the temperature rises to about 40 degree °C
- After half to 1 hour the hot phase begins and lasts for several hours
- The cycle repeats 48 hours later
- Anemia develops slowly
- P. malariae infection
- Usually associated with mild symptoms and bouts of fever every third day
- It causes glomerulonephritis and nephritic syndrome in children

*P. falciparum* infection
- Onset is often insidious with malaise, headache and vomiting
- Cough and mild diarrhea
- The fever has no particular pattern and usually not so high
- Jaundice is common anemia develops rapidly

Diagnosis

Diagnosis is made by making thick and thin blood films and observing under microscope.
## Treatment

<table>
<thead>
<tr>
<th>1. Clinically diagnosed malaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroquine tab. (150mg base)</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; day</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; day</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; day</td>
</tr>
</tbody>
</table>

### 2. Radical treatment of benign tertian malaria (P. vivax)

<table>
<thead>
<tr>
<th>Chloroquine (150 mg)</th>
<th>Primaquine (15 mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; day</td>
<td>4 tabs (600 mg)</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; day</td>
<td>3 tabs (450 mg)</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; day</td>
<td>3 tabs (450 mg)</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; &amp; 5&lt;sup&gt;th&lt;/sup&gt; day</td>
<td>1 tab (15 mg)</td>
</tr>
</tbody>
</table>

### 3. Radical treatment of falciparum malaria.

a) First line of treatment (chloroquine sensitive)

- Chloroquine (150 mg base) : 1<sup>st</sup> day 4 tabs, 2<sup>nd</sup> day & 3<sup>rd</sup> day 3 tabs
- Primaquine (15 mg base) : 3 tabs on 4<sup>th</sup> day

b) Second line of treatment (Chloroquine resistant)

- 1<sup>st</sup> day : sulfadoxine (500 mg) 3 tabs + Pyrimethamine (25 mg) 3 tabs
- 2<sup>nd</sup> day : Primaquine (15 mg) 3 tabs

c) Third line treatment (when second line fails)

- 1<sup>st</sup> to 7<sup>th</sup> day : Quinine sulphate (300 mg) 2 tabs 8 hourly daily + Tetracycline (250 mg) 1 cap 6 hourly
- 8<sup>th</sup> day : Primaquine (15 mg) 3 tabs

**Note: Doses should be given after meal**

### Prevention

- Health education
- Early diagnosis and treatment
- Use of mosquito net
- Chemoprophylaxis for travelers from the non endemic areas
• Cleaning the surroundings e.g. bushes small ponds etc
• Use of insecticides and pesticides to kill the mosquitoes

Malaria control program

The first attempt to control malaria in Nepal was initiated in 1954 through the Insect Borne Disease Control Program, supported by USAID. In 1958, the malaria eradication program was launched (the first national public health program in the country) with an objective of eradicating malaria from the country within a limited time period. Due to various constraints, this objective could not be achieved and consequently the program reverted to malaria control in 1978. Prevailing ecological, epidemiological and socio-economic factors suggested changes in the malaria control strategy, and as a result the current strategy was revised in accordance with the Global Malaria Control Strategy (GMCS) 1992 of WHO. Malaria control services are provided to approximately 15.6 million people in malaria-risk areas of 64 districts of the country.

Objectives

• Prevention of mortality due to malaria
• Reduction in malaria morbidity
• Prevention and control of epidemics with particular reference to *P. falciparum* (PF)
• Containment of *P. falciparum* and drug-resistant malaria

Target

• To reduce or contain the Annual Parasite Incidence (API) at the level of 3/1000 population in malaria risk areas.

Strategies

• Early diagnosis and prompt treatment (EDPT) of uncomplicated malaria cases and development of referral systems for complicated and severe cases,
• Development of laboratory facilities for strengthening early diagnosis of cases in health institutions,
• Selective application of indoor residual spraying (in the case of epidemics, epidemic-prone new settlements, PF abundant areas and drug resistant foci),
• Promotion of personal protection measures (PPM) through IEC,
• Encouragement to communities for minor environmental manipulations facilitating malaria control,
• Promotion of insecticide-impregnated bed nets wherever possible as a method of vector control and transmission risk-reduction,
• Development of skill of peripheral level health staff on different aspects of malaria control (e.g. EDPT, vector control, referral services, and prevention and control of epidemics),
• Development of skill of MOs and DHOs in the management of severe and drug-resistant malaria,
• Promote operational field research on malaria on a regular basis, and
• Develop/strengthen monitoring mechanism on susceptibility of vectors to insecticides, drug-resistant malaria, and vector bionomics.
Kala jar (leishmaniasis)

Leishmaniasis is a protozoal disease caused by parasites of genus *Leishmania*.

**Problem statement (Nepal)**

- Kala-azar has been reported in 12 Terai districts
- More than 5.5 million people in Nepal are believed to be at risk of this disease.
- Since 1980, a total of 14,865 cases and 215 deaths have been reported from this disease
- The Case Fatality Rate (CFR) ranged from 0.84% to 1.75%.

**Agent**

*Leishmania donovani*

**Mode of transmission**

Transmitted from person to person by the bite of the female phlebotomine sandfly

**Incubation period**

Generally 1 to 4 months, may be up to 10 years

**Clinical features**

- The onset is usually insidious with a low grade fever
- High intermittent fever, sometimes showing a double rise of temperature in 24 hours
- Good appetite, clean moist tongue
- Hepatospleenomegaly
- Pigmentation especially on the face, cough and diarrhea

**Diagnosis**

- Parasitological test
- Aldehyde test
- Serological tests
- Leishmanin test
- Haematological findings

**Prevention**

- Application of residual insecticides to control sandflies
- Proper sanitation around the house
- Elimination of breeding places (cracks in mud or stone walls, rodent burrows etc)
- Health education
- Use of nets
Kala-azar Control Program

The Kala-azar Control Programme aims to reduce Kala-azar morbidity and mortality by applying the primary health care approach, including active community participation.

Objectives

- To reduce morbidity and mortality due to Kala-azar,
- To determine the efficacy of the first-line drug SAG,
- To prevent epidemics due to Kala-azar.

Strategies

- Early diagnosis and prompt treatment (EDPT) of Kala-azar cases through strengthening of referral services at the peripheral health institutions,
- Early detection and timely containment of Kala-azar epidemics,
- Establishment of appropriate laboratory diagnostic facilities,
- Protection of at-risk population with (highly selective) indoor residual spraying (IRS),
- Promotion of health education for community awareness of Kala-azar, so that early diagnosis and timely treatment can be performed,
- Training of HP In-charges, PHOs, DHOs and Medical Officers on Kala-azar control and management,
- Conducting field research on the epidemiology of Kala-azar, vector bionomics and the effectiveness of different anti-Kala-azar drugs.
Acute respiratory tract infection

It is an inflammation of respiratory tract from nose to alveoli.

Classification

**AURI (acute upper respiratory tract infection)**
- Common cold
- Pharyngitis
- Otitis media

**ALRI (acute lower respiratory tract infection)**
- Epiglottis
- Laryngitis
- Laryngotracheitis
- Bronchitis
- Bronchiolitis
- Pneumonia

Nepal’s statement

- Mostly children are affected
- Children under 15 years constitute 42% of the total population of the country
- 3 major killer diseases are Diarrhea, RTI., Measles till now
- About 75000 children die each year
- Between 17% & 35% of all under 5 years deaths are caused by pneumonia

Agent

- Streptococcus pneumoniae
- Streptococcus pyogenes
- Staphylococcus pyogenes
- Klebsiella pneumonia
- Legionella pneumophila
- Haemophilus influenzae
- Adenoviruses
- Entero viruses
- Influenza A, B, C
- Measles
- Parainfluenza
- Rinoviruses
- Coronavirus
Mode of transmission
- Airborne route
- Direct person to person contact

**IMCI classification and management of ARI**

<table>
<thead>
<tr>
<th>Signs/ symptoms</th>
<th>Classification</th>
<th>Therapy/ management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not able to drink</td>
<td>Very severe disease</td>
<td>Admission</td>
</tr>
<tr>
<td>Convulsion</td>
<td></td>
<td>Give Oxygen</td>
</tr>
<tr>
<td>Stridor at calm</td>
<td>Very severe Pneumonia</td>
<td>Antibiotics e.g. Chloramphenical 25 mg/kg/dose IM *QID</td>
</tr>
<tr>
<td>Cyanosis</td>
<td></td>
<td>Treat for wheeze if present</td>
</tr>
<tr>
<td>Severe chest in drawing</td>
<td></td>
<td>Supportive care</td>
</tr>
<tr>
<td>Severe malnutrition</td>
<td></td>
<td>Reassess twice daily</td>
</tr>
<tr>
<td>Chest in drawing</td>
<td>Severe Pneumonia</td>
<td>If signs and symptoms not removed by 48 hours of Chloramphenical switch to Cloxacillin + Gentamycin</td>
</tr>
<tr>
<td>No cyanosis</td>
<td></td>
<td>Admission</td>
</tr>
<tr>
<td>Able to drink</td>
<td></td>
<td>Give Oxygen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antibiotics Benzyl penicillin 50000 IU/Kg/dose IM * QID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treat fever, wheeze if present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supportive care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reassess daily</td>
</tr>
<tr>
<td>No chest in drawing</td>
<td>Pneumonia</td>
<td>If signs and symptoms are not released by 48 hours of Benzyl Penicillin switch to Cloxacillin + Gentamycin</td>
</tr>
<tr>
<td>Fast breath</td>
<td></td>
<td>Home care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keep baby warm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Breast fed frequently</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antibiotics, Cotrimoxazole or Ampicillin or Amoxacillin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treat fever &amp; wheeze if present</td>
</tr>
<tr>
<td>No fast breath</td>
<td>No Pneumonia</td>
<td>Home care</td>
</tr>
<tr>
<td>Cough &amp; cold</td>
<td>OR</td>
<td>Keep baby warm</td>
</tr>
<tr>
<td></td>
<td>Cough &amp; cold</td>
<td>Breast fed frequently</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treat fever &amp; wheeze if present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If cough &gt;30 days assess for chronic cough</td>
</tr>
</tbody>
</table>

Table 12 IMCI classification and management of ARI of children age 2 month to 5 years

Infant <2 months Age
<table>
<thead>
<tr>
<th>Signs/ symptoms</th>
<th>Classification</th>
<th>Therapy/ management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stopped feeding well</td>
<td>Very severe disease</td>
<td>Admit</td>
</tr>
<tr>
<td>Convulsion</td>
<td>OR</td>
<td>Oxygen</td>
</tr>
<tr>
<td>Abnormally sleepy or</td>
<td>very severe pneumonia</td>
<td>Antibiotics Benzyl Penicillin 50000 IU /kg/dose IM *QID</td>
</tr>
<tr>
<td>difficulty to wake</td>
<td></td>
<td>Maintain good thermal environment</td>
</tr>
<tr>
<td>Stridor in calm child</td>
<td></td>
<td>Treat wheeze, fever if present</td>
</tr>
<tr>
<td>Wheezing</td>
<td></td>
<td>If patient not better after 48 hours of benzyl penicillin switch to inj. Gentamicin</td>
</tr>
<tr>
<td>Fever 38 degree C or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast breath</td>
<td>Severe Pneumonia</td>
<td>Admission</td>
</tr>
<tr>
<td>Severe chest in drawing</td>
<td></td>
<td>Antibiotics Benzyl Penicillin 50000 IU /kg/dose IM *QID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain good thermal environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treat wheeze, fever if present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If patient not better after 48 hours of benzyl penicillin switch to inj. Gentamicin</td>
</tr>
<tr>
<td>No Severe chest in</td>
<td>No Pneumonia</td>
<td>Home care</td>
</tr>
<tr>
<td>drawing</td>
<td></td>
<td>Keep warm</td>
</tr>
<tr>
<td>No fast breath</td>
<td>OR</td>
<td>Breast fed frequently</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear nose if it interfere with feeding</td>
</tr>
<tr>
<td>Cough &amp; cold</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Prevention

- Appropriately treating underlying illnesses (such as AIDS) can decrease a person's risk of pneumonia.
- Suctioning the mouth and throat of infants with meconium-stained amniotic fluid decreases the rate of aspiration pneumonia.
- Vaccination is important for preventing pneumonia in both children and adults.
- Maintaining good hygiene.
- Cleaning the environment.

Control of Acute Respiratory Infection

Background
The Ministry of Health (MOH) recognizes that Acute Respiratory Infection (ARI) is one of the major public health problems in Nepal among children less than 5 years (60 months) of age. The National Control of ARI Program is an integral part of primary health care and has been accorded high priority by the MOH. The program focuses on children under five years because the majority of deaths in this age group are ARI-related. The MOH recognizes the need to follow the World Health Organization (WHO) guidelines for the classification of ARI cases. Therefore, all cases of ARI assessed by health workers have been classified into one of the following categories:

- Very severe disease;
- Severe pneumonia;
- Pneumonia; or
- No pneumonia.

Objectives
The main objective of the ARI program is to reduce under-five ARI-related morbidity and mortality and to improve the situation of child health in Nepal.

Target
- To reduce the mortality from pneumonia in under-five children through proper diagnosis and management of cases;
- To reduce morbidity from ARI in under-five children.

Strategies
General Strategies

- Educate mothers and child caretakers in supportive care strategies and in recognizing the signs and symptoms of ARI and pneumonia.
- Develop a health education program aimed at raising awareness of ARI as a public health problem for the community in general and for families in particular, and encourage active community participation in coping with the problem.
Introduction to Public Health

- Train health workers and CHWs according to WHO guidelines on standard ARI case management.
- Support related activities to encourage breastfeeding, provide nutrition education, increase EPI coverage, promote maternal and child health care, and utilize family planning services.
- Avoid use of cough suppressants, remedies and antibiotics in the management of coughs and colds.
- Deliver the program through a primary health care approach.
- Utilize operational studies to define local ARI problems and to measure the effect of introducing new ARI approaches.
- Continue monitoring of the ARI Control Program.
- Strengthen the ability of the District Health Offices (DHOs) to supervise the ARI Program according to WHO guidelines.

Specific Strategies for the Ninth Five Year Plan

- Train all levels of health workers.
- Train schoolteachers.
- Orient chemists/druggists.
- Give community-based IMCI training in three districts.
- Orient community leaders, including DDC and VDC members, faith healers, and mothers.
- Supply Cotrimoxazole Paediatric tablets to all health institutions.
- Supply Cotrimoxazole Paediatric tablets to all FCHVs in 11 districts (Chitwan, Makawanpur, Morang, Sunsari, Jhapa, Parsa, Siraha, Rautahat, Bara, Rasuwa and Bajura).
- Supply sound timers to all FCHVs in 11 districts.
- Develop IEC materials.
- Assist NHEICC in the revision of ARI messages.
- Manage ARI cases, applying standard ARI case management protocol.
- Supervise/monitor at all levels.
Prevention and control of communicable diseases

- Control of reservoir
- Early diagnosis
- Notification
- Epidemiological investigation
- Isolation
- Treatment
- Quarantine
- Surveillance and disinfections

Interruption of transmission

![Diagram showing the interruption of transmission](image)

Figure 11 Interruption of transmission
Sanitation barrier

- Feces
- Finger
- Flies
- Soil
- Water
- Food
- New Host

Figure 12 Sanitation barrier

Protection from susceptible host

- Active immunization
- Passive immunization
- Combined active and passive immunization
- Chemoprophylaxis
- Non specific measures
Non-communicable diseases

Non-communicable diseases (NCDs) include diseases which do not have defined infectious agents which make them spread from one person to another. The magnitude of disease depends on heredity, surroundings, behavior etc. NCD is an illness Caused by other than the pathogen it means disease the disease has multi-factorial causation. Sometimes disease might result from lifestyle factor though it is also called disease of affluence.

Examples of non communicable diseases

- Cardiovascular system
  - Hypertension
  - Rheumatic heart disease (RHD)
  - Atherosclerosis
  - Ischemic heart disease
- Respiratory diseases
  - COPD
  - Asthma
- Nervous and mental diseases
  - Parkinsonism
  - Alzheimer’s disease
- Renal diseases
  - Nephritic syndrome
- Malignancies
  - Carcinoma cervix
  - Lung carcinoma
- Musculoskeletal condition
  - Osteoporosis
- Ocular disease
  - Blindness
  - Cataract
  - Retinopathies
- Permanent damage from accident

Epidemiology of non communicable disease

Gaps in natural history

- Absence of a known agent
- Multi-factorial causation
- Long latent period
- Indefinite onset
Distribution
These types of diseases distributed world widely. Nowadays more prevalence seen in developing country

Determinants
The non communicable diseases have multi-factorial causation so discussion about risk factors is necessary

Risk factors
In general means risk factor for an individual are:
- Genetic susceptibility
- Behavioral susceptibility
- Environmental factors
- Stress factors
- And the interactions between all above factors.
These factors, generally brings molecular and structural changes in organs and tissues. **Risk factors place an individual at a greater likelihood of developing disease.**

<table>
<thead>
<tr>
<th>Modifiable Risk Factors for Non-Communicable Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Environmental Exposures</strong></td>
</tr>
<tr>
<td>Physical environment:</td>
</tr>
<tr>
<td>ambient air quality</td>
</tr>
<tr>
<td>water quality</td>
</tr>
<tr>
<td>occupational and work site</td>
</tr>
<tr>
<td>food safety and availability</td>
</tr>
<tr>
<td>Social environment:</td>
</tr>
<tr>
<td>income</td>
</tr>
<tr>
<td>cognitive education</td>
</tr>
<tr>
<td>cultural education</td>
</tr>
<tr>
<td>access to health services</td>
</tr>
<tr>
<td>availability of public health and community services</td>
</tr>
<tr>
<td><strong>Personal Environmental Exposures</strong></td>
</tr>
<tr>
<td>Smoking (and tobacco use)</td>
</tr>
<tr>
<td>Nutrition and Obesity</td>
</tr>
<tr>
<td>dietary intake</td>
</tr>
<tr>
<td>micronutrient adequacy</td>
</tr>
<tr>
<td>caloric balance</td>
</tr>
<tr>
<td>Physical Activity</td>
</tr>
<tr>
<td>Alcohol/Drug Abuse</td>
</tr>
<tr>
<td>Genetic endowment</td>
</tr>
<tr>
<td>Modifiable Risk Factors for Non-Communicable Diseases</td>
</tr>
</tbody>
</table>

Table 13 Modifiable Risk Factors for Non-Communicable Diseases
Non-modifiable risk factors for NCDs

- Genetic susceptibility
- Age
- Sex
- Environmental factors

Prevention and control of non communicable diseases

- Wide spectrum of services
- Case finding through screening and health examination techniques
- Application of improved method of diagnosis
- Treatment and rehabilitation
- Control of food, water, air pollution
- Reducing accident
- Influencing patterns of human behaviours and life style through intensive education
- Comprehensive medical care including PHC
- Political approaches in case of smoking control, control of alcohol and drug abuse
- Holistic approach of medical and social preventive care
Injuries: domestic and industrial

Injury is damage or harm caused to the structure or function of the body caused by an outside agent or force, which may be physical or chemical.

Industrial injury

An industrial injury is any disease or bodily damage resulting from working.

Organs Involved

The most usual organs involved are the spine, hands, the head, lungs, eyes, skeleton, and skin.

Common Causes

- poor ergonomics, (the study of working conditions, especially the design of equipment and furniture, in order to help people work more efficiently)
- manual handling of heavy loads,
- misuse or failure of equipment,
- exposure to general hazards,
- inadequate safety training and clothing,
- Jewellery or long hair that becomes tangled in machinery

General hazards in a work environment include:

- electricity,
- explosive materials,
- fire,
- flammable gases,
- heat,
- height,
- high pressure gases and liquids,
- hot gases and liquids,
- powerful or sharp moving machinery,
- oxygen-free gases or spaces,
- poisonous gases,
- radiation,
- toxic materials,
- work on, near or under water,
- Work on, near or under weak or heavy structures.
List of well known industrial injuries

- Air embolism caused by working with compressed air close to cuts in the skin.
- Asbestosis caused by working near asbestos.
- Decompression sickness caused by working underwater in a high ambient pressure environment
- Hand-arm vibration syndrome/HAVS/white finger caused by long-term use of vibrating tools
- Phossy jaw caused by chronic exposure to white phosphorus
- Repetitive strain injury
- Silicosis caused by working in a confined, dusty environment

Methods on Preventing

There are many methods on preventing or reducing industrial injuries, including:

- anticipation of problems by risk assessment,
- safety training,
- safety clothing,
- breathing equipment,
- safety guards,
- mechanisms on machinery,
- Safety barriers.

In addition, past problems can be analyzed to find their root causes by using a technique called root cause analysis.

<table>
<thead>
<tr>
<th>South East Asia</th>
<th>Injury</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120 million injury per year</td>
<td>200,000 deaths per year</td>
</tr>
</tbody>
</table>

Sources: K. Park

Table 14 Data of Industrial Injury
Domestic injury

Domestic injury is an injury which takes place in home or its similar surrounding and generally concerned with traffic, vehicles or sports.

Organs Involved

The most usual organs involved are the spine, hands, the head, lungs, eyes, skeleton, and skin.

Common Causes

- Burning by flame, acids, crackers, electricity, etc.
- Intake of kerosene, drugs, insecticides
- Fall from tree, house roof, steep slopes
- From sharp and pointed instruments
- Biting from animals, insects etc.
- Drowning

List of well known domestic injury

- Drowning

Most of the drowning related deaths take place in ponds, rivers or ocean or during floods etc. In some case, due to boat or ship capsizing or accidents many people drown in lake, ocean and finally they die. Victim loses consciousness after two minutes of immersion and brain is damaged during 4-6 minutes

- Burns

The impact of burns, specially sever ones is worse in developing countries compared to high income countries because of infections and lack of adequate physiotherapy.

- Poisoning

Ingestion of toxic substance such as insecticide, harmful oil, grease, drug, etc causes poisoning. Especially young children have high chances of ingesting these harmful substances.

A study from Thailand revealed that 54% of cases of poisoning among pre-school children involved therapeutic drugs.

In case of Nepal, the most frequent toxicity causes due to organic-phosphate poisoning i.e. Metacid
• Falls

Falls are responsible for largest number of hospital visits for non-fatal injuries especially for children and young adults. Especially, the most of the cases are fall from fruit trees, house roof, etc.

• Others

Other domestic injuries include snake bite, frost bite, cuts from household utensils such as knife, spoon spade, shovel, etc. In developing countries like Nepal, these additional injuries are responsible for disability of people and in certain case cause deaths.

Methods on Preventing

There are many methods on preventing domestic injuries including:

• Avoid playing at unsafe areas such as near river, lake, sea, etc.
• Avoid going to bushy and jungle areas where there are thorns, snake, etc.
• Be careful while handling electric and sharp appliances at home.
• Avoid using rational drugs.
• Keep the insecticides and poison out of the reach of children.
• Be careful while using fire at household affairs.
• Do not climb at high and steep areas.
• Use railings at house stairs and high verandah.

<table>
<thead>
<tr>
<th>Drowning</th>
<th>Burn</th>
<th>Poisoning</th>
<th>Falls</th>
</tr>
</thead>
<tbody>
<tr>
<td>South East Asian Region: 98 thousands lives were lost.</td>
<td>South East Asian Region: 184,000 persons died of burn.</td>
<td>South East Asian Region: 95,000 deaths from poisoning.</td>
<td>South East Asian Region: 121,000 deaths due to fall.</td>
</tr>
<tr>
<td>Bangladesh and Maldives: Identified drowning as most common cause of accidental deaths.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India: 20960 deaths from drowning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand: 35% child death due to drowning.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sources: K. Park*

Table 15 Data of Major Domestic Injury In 2002
Prevention of injury

- Primordial and Primary Prevention
- Secondary Prevention
- Immediate Resuscitation (First Aid, Quick Referral & Early hospital)
- Tertiary Prevention

<table>
<thead>
<tr>
<th>Cause</th>
<th>Total deaths in 1000</th>
<th>Percentage of all causes deaths by injury</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Unintentional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Accident</td>
<td>992</td>
<td>16.80</td>
</tr>
<tr>
<td>Poisoning</td>
<td>350</td>
<td>4.35</td>
</tr>
<tr>
<td>Falls</td>
<td>392</td>
<td>4.56</td>
</tr>
<tr>
<td>Fires</td>
<td>312</td>
<td>2.32</td>
</tr>
<tr>
<td>Drowning</td>
<td>382</td>
<td>2.06</td>
</tr>
<tr>
<td>Other</td>
<td>923</td>
<td>11.51</td>
</tr>
<tr>
<td>Intentional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self inflict</td>
<td>873</td>
<td>10.56</td>
</tr>
<tr>
<td>Violence</td>
<td>559</td>
<td>8.61</td>
</tr>
<tr>
<td>War</td>
<td>172</td>
<td>2.29</td>
</tr>
<tr>
<td>Total</td>
<td>5155</td>
<td>67.01</td>
</tr>
</tbody>
</table>

Table 16 Global estimates of Injuries related deaths by cause and sex (2002)

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Chances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Traffic</td>
<td>1</td>
</tr>
<tr>
<td>Burns</td>
<td>3</td>
</tr>
<tr>
<td>Work related</td>
<td>2</td>
</tr>
<tr>
<td>Poisoning</td>
<td>5</td>
</tr>
<tr>
<td>Drowning</td>
<td>7</td>
</tr>
<tr>
<td>Violence/Suicide</td>
<td>4</td>
</tr>
<tr>
<td>Falls</td>
<td>6</td>
</tr>
</tbody>
</table>

Sources: K. Park
Note 1=highest priority 7=lowest priority

Table 17 Chances of death in context of Nepal
Figure 13 Distribution of global injury mortality by cause (2002)
Reproductive tract infections

Reproductive tract infections are infections of the genital tract. They affect both women and men. Some RTIs (such as syphilis and gonorrhea) are sexually transmitted, but many are not. In women, overgrowth of endogenous microorganisms normally found in the vagina may cause RTI (yeast infection, bacterial vaginosis).

Prevention of STIs/RTIs and their complications require a common approach within reproductive health services. The clinical appearance of different STIs/RTIs overlaps, especially in women. Symptoms noticed by patients, and even the clinical signs found by health care providers, are often similar, making the distinction between sexually and non-sexually transmitted RTIs difficult.

In reproductive health settings such as antenatal and family planning clinics, non-sexually-transmitted RTIs are usually more common than STIs. Different approaches to management are needed to provide appropriate care and minimize stigma. Health care providers should recognize that labeling a condition as sexually transmitted may be inaccurate and have serious social consequences for the couple.

Sites of Infections

![Figure 14 Male reproductive tract](image1.png) ![Figure 15 Female reproductive tract](image2.png)
# Types of infections

<table>
<thead>
<tr>
<th>Types of infections</th>
<th>Where they come from</th>
<th>How they spread</th>
<th>Common examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endogenous infections</td>
<td>Organisms normally found in vagina</td>
<td>Usually not spread from person to person, but overgrowth can lead to symptoms</td>
<td>Yeast infection, bacterial vaginosis</td>
</tr>
<tr>
<td>Sexually transmitted infections</td>
<td>Sexual partners with STI</td>
<td>Sexual contact with infected partner</td>
<td>Gonorrhoea, Chlamydia, syphilis, chancroid, trichomoniasis, genital herpes, genital warts, HIV</td>
</tr>
<tr>
<td>Iatrogenic infections</td>
<td>Inside or outside the body: Endogenous (vagina) STI (cervix or vagina) Contamination from outside</td>
<td>By medical procedures or following examination or intervention during pregnancy, childbirth, the postpartum period or in family planning (e.g., IUD insertion) and gynecology settings. Infection may be pushed through the cervix into the upper genital tract and cause serious infection of the uterus, fallopian tubes and other pelvic organs. Contaminated needles or other instruments, e.g. uterine sounds, may transmit infection if infection control is poor.</td>
<td>Pelvic inflammatory disease (PID) following abortion or other transcervical procedure. Also, many infectious complications of pregnancy and postpartum period.</td>
</tr>
</tbody>
</table>

Table 18 Types of infections
Common types of RTIs

<table>
<thead>
<tr>
<th>S.N</th>
<th>Infections</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HIV</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Syphilis</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Gonorrhea</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Trichomoniasis</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Bacterial Vaginosis</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Chlamydia</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Herpes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Yeast infection</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>Chancroid</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Genital warts</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 19 Common types of RTIs

The global disease burden of reproductive tract infections (RTIs) is enormous and a major public health concern. Nearly 1 million people become infected with a sexually transmitted infection every day. Among these infections, HIV/AIDS, syphilis, gonorrhea, bacterial vaginosis, etc are common and important ones and are described below:

**HIV/AIDS**

AIDS stands for the acquired immunodeficiency syndrome. It is caused by HIV and occurs when the virus has destroyed so much of the body's defenses that immune-cell counts fall to critical levels or certain life-threatening infections or cancers develop. HIV (human immunodeficiency virus) infection has now spread to every country in the world. Approximately 38 million people are currently living with HIV infection, and an estimated 25 million have died from this disease. The scourge of HIV has been particularly devastating in sub-Saharan Africa, but infection rates in other countries remain high. Here are a few key points about the disease:

*Causative agent*

Human Immuno Deficiency Virus (HIV). It is one of a group of viruses known as retroviruses. After getting into the body, the virus kills or damages cells of the body's immune system. The body tries to keep up by making new cells or trying to contain the
virus, but eventually the HIV wins out and progressively destroys the body's ability to fight infections and certain cancers.

Risk groups

- Homo & Hetero sexual (85%) partners,
- I/V drug users,
- Recipients of blood & its products,
- Concentrated among sex workers (in Nepal)

Mode of Transmission

HIV is transmitted when the virus enters the body, usually by injecting infected cells or semen. There are several possible ways in which the virus can enter.

Most commonly, HIV infection is spread by having sex with an infected partner. The virus can enter the body through the lining of the vagina, vulva, penis, rectum, or mouth during sex.

HIV frequently spreads among injection-drug users who share needles or syringes that are contaminated with blood from an infected person.

Women can transmit HIV to their babies during pregnancy or birth, when infected maternal cells enter the baby's circulation.

HIV can be spread in health-care settings through accidental needle sticks or contact with contaminated fluids.

Very rarely, HIV spreads through transfusion of contaminated blood or blood components. Blood products are now tested to minimize this risk. If tissues or organs from an infected person are transplanted, the recipient may acquire HIV. Donors are now tested for HIV to minimize this risk.

People who already have a sexually transmitted disease, such as syphilis, genital herpes, Chlamydia infection, gonorrhea, or bacterial vaginosis, are more likely to acquire HIV infection during sex with an infected partner.

The virus does not spread through casual contact such as preparing food, sharing towels and bedding, or via swimming pools, telephones, or toilet seats. The virus is also unlikely to be spread by contact with saliva, unless it is contaminated with blood.
Symptoms

Many people with HIV do not know they are infected.

Many people do not develop symptoms after they first get infected with HIV. Others have a flu-like illness within several days to weeks after exposure to the virus. They complain of fever, headache, tiredness, and enlarged lymph nodes in the neck. These symptoms usually disappear on their own within a few weeks. After that, the person feels normal and has no symptoms. This asymptomatic phase often lasts for years. The progression of disease varies widely among individuals. This state may last from a few months to more than 10 years.

During this period, the virus continues to multiply actively and infects and kills the cells of the immune system.

The virus destroys the cells that are the primary infection fighters, called CD4 cells.

Even though the person has no symptoms, he or she is contagious and can pass HIV to others through the routes listed above.

AIDS is the later stage of HIV infection, when the body begins losing its ability to fight infections. Once the CD4 cell count falls low enough, an infected person is said to have AIDS. Sometimes, the diagnosis of AIDS is made because the person has unusual infections or cancers that show how weak the immune system is:

Symptomatic phase

The infections that happen with AIDS are called opportunistic infections because they take advantage of the opportunity to infect a weakened host. The infections include (but are not limited to) pneumonia caused by Pneumocystis, which causes wheezing, brain infection with toxoplasmosis which can cause trouble thinking or symptoms that mimic a stroke, widespread infection with a bacteria called MAC (mycobacterium avium complex) which can cause fever and weight loss, yeast infection of the swallowing tube (esophagus) which causes pain with swallowing, and wide spread diseases with certain fungi like histoplasmosis, which can cause fever, cough, anemia, and other problems.
A weakened immune system can also lead to other unusual conditions: lymphoma in the brain, which can cause fever and trouble thinking; or a cancer of the tissues called Kaposi's sarcoma, which causes brown, reddish, or purple spots that develop on the skin or in the mouth.

**Diagnosis**

HIV infection is commonly diagnosed by blood tests that detect antibodies the body makes in an attempt to fight the virus. It can take some time for the immune system to produce enough antibodies for the antibody test to detect them. This time period is commonly referred to as the "window period" and may take six weeks to three months following infection. Therefore, if the initial test after exposure is negative, a repeat test should be performed three months later. Early testing is crucial; because early treatment for HIV helps people avoid or minimize complications. Furthermore, high-risk behaviors can be avoided, thus preventing the spread of the virus to others.

Testing for HIV is a two-step process. First, an inexpensive screening test is done. If that test is positive, a second test (Western blot) is done to confirm the result.

The Enzyme Linked Immuno Sorbent Assay (ELISA) used on the blood is the most common screening test. Other ELISA tests can detect antibodies in body fluids other than blood such as oral fluid, urine, and vaginal secretions.

Rapid tests are alternative screening tests that produce quick results in approximately 20 minutes. There are FDA-approved tests that use blood or oral fluid. These tests have accuracy rates similar to traditional EIA tests.

HIV home-testing kits are available at many local drug stores. Blood is obtained by a finger prick and blotted on a filter strip. The blood is mailed in a protective envelope to a laboratory to be tested.

All positive screening tests must be confirmed with a follow-up blood test called the Western blot to make a positive diagnosis.

Other tests, such as those that look for virus RNA, are used less commonly.

**Medications**

A combination of at least three drugs is recommended to suppress the virus from replicating and boost the immune system. The different classes of medications include

*Reverse transcriptase inhibitors:* These drugs inhibit the ability of the virus to make copies of itself. Examples include...
Nucleoside or Nucleotide reverse transcriptase inhibitors (NRTIs). These include medications such as zidovudine, didanosine.

Non-nucleoside reverse transcriptase inhibitors (NNRTIs) are commonly used in combination with NRTIs to help keep the virus from multiplying. Examples of NNRTIs are efavirenz.

Protease inhibitors (PIs): These medications interrupt virus replication at a later step in its life cycle, preventing cells from producing new viruses. These include ritonavir, a lopinavir and ritonavir combination, saquinavir.

Fusion and entry inhibitors are newer agents that keep HIV from entering human cells. Enuviritide (Fuzeon®/T20) was the first drug in this group. It is given in injectable form like insulin.

Integrase inhibitors stop HIV genes from becoming incorporated into the human cell's DNA. Raltegravir (Isentress) was the first drug in this class approved by the FDA, in 2007.

Antiretroviral viral drugs stop viral replication and delay the development of AIDS. However, they also have side effects that can be severe. They include decreased levels of red or white blood cells, inflammation of the pancreas, liver toxicity, rash, gastrointestinal problems, elevated cholesterol level, diabetes, abnormal body-fat distribution, and painful nerve damage.

Pregnant women who are HIV-positive should seek care immediately because HAART therapy reduces the risk of transmitting the virus to the fetus. There are certain drugs, however, that are harmful to the baby. Therefore, seeing a physician to discuss anti-HIV medications is crucial.

Prevention

Despite significant efforts, there is no effective vaccine against HIV. The only way to prevent infection by the virus is to avoid behaviors that put you at risk, such as sharing needles or having unprotected sex. In this context, unprotected sex means sex without a barrier, such as a condom. Because condoms break, even they are not perfect protection. Many people infected with HIV don't have any symptoms. There is no way to know with certainty whether a sexual partner is infected. Here are some prevention strategies:

- Abstain from sex. This obviously has limited appeal, but it absolutely protects against HIV transmission by this route.
- Have sex with a single partner who is uninfected. Mutual monogamy between uninfected partners eliminates the risk of sexual transmission of HIV.
- Use a condom in other situations. Condoms offer some protection if used properly and consistently. Occasionally, they may break or leak. Only condoms made of latex should be used. Only water-based lubricants should be used with latex condoms.
- Do not share needles or inject illicit drugs.
• If you work in a health-care field, follow national guidelines for protecting yourself against needle sticks and exposure to contaminated fluids.
• If you have engaged in risky behaviors, get tested to see if you have HIV.
• The risk of HIV transmission from a pregnant woman to her baby is significantly reduced if the mother takes medications during pregnancy, labor, and delivery and her baby takes medications for the first six weeks of life. Even shorter courses of treatment are effective, though not as optimal. The key is to get tested for HIV as early as possible in pregnancy. In consultation with their physician, many women opt to avoid breastfeeding to minimize the risk of transmission after the baby is born.
Trichomoniasis

Trichomoniasis, sometimes referred to as "trich", is a common cause of vaginitis. Trichomoniasis is primarily an infection of the urogenital tract; the most common site of infection is the urethra and the vagina in women. It results both from shared external water sources (hot tubs, wet bathing suits, wet towels and washcloths), and as a sexually transmitted disease (STD).

Causative agent

It is caused by the single-celled protozoan parasite Trichomonas vaginalis.

Risk groups

- Most common in women
- Uncircumcised men. For uncircumcised men, the most common site for the infection is the tip of the penis.

Mode of transmission

- Shared external water sources
- As a STD

Symptoms

Typically, only women experience symptoms associated with Trichomonas infection.

- Vaginitis - itching, burning, and inflammation of the vagina
- Cervicitis - inflammation of the cervix
- Urethritis - inflammation of the urethra
- Green/Yellow, frothy vaginal discharge

(Symptoms usually appear in women within 5 to 28 days of exposure)

Most men with trichomoniasis do not have signs or symptoms; however, some men may temporarily have an irritation inside the penis, mild discharge, or slight burning after urination or ejaculation.

Diagnosis

Trichomoniasis is diagnosed by visually observing the trichomonads via a microscope. In women, the doctor collects the specimen during a pelvic examination by inserting a speculum into the vagina and then using a cotton-tipped applicator to collect the sample. The sample is then placed onto a microscopic slide and sent to a laboratory to be analyzed. An examination in the presence of trichomoniasisptaulas may also reveal small red ulcerations on the vaginal wall or cervix; if occurring on the cervix, is termed "strawberry cervix."
Treatment

Treatment for both pregnant and non-pregnant patients usually utilizes metronidazole 2000mg oral one time by mouth. Sexual partners, even if asymptomatic, should be concurrently treated.

Complications

Trichomoniasis is associated with increased risk of transmission of HIV.

Trichomoniasis may cause a woman to deliver a low-birth-weight or premature infant.

Prevention

Use of male condoms may help prevent the spread of trichomoniasis, although careful studies have never been done that focus on how to prevent this infection.

Refraining from sharing swimsuits or towels may also help as trichomonads survive for up to 45 minutes outside of the body. Treatment is usually Metronidazole.
Genital Human Papillomavirus Infection

Genital Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI).

Causative agent

HPV - The virus infects the skin and mucous membranes. There are more than 40 HPV types that can infect the genital areas of men and women, including the skin of the penis, vulva (area outside the vagina), and anus, and the linings of the vagina, cervix, and rectum. You cannot see HPV. Most people who become infected with HPV do not even know they have it.

Symptoms & consequences

Most people with HPV do not develop symptoms or health problems. But sometimes, certain types of HPV can cause genital warts in men and women. Other HPV types can cause cervical cancer and other less common cancers, such as cancers of the vulva, vagina, anus, and penis. The types of HPV that can cause genital warts are not the same as the types that can cause cancer.

HPV types are often referred to as “low-risk” (wart-causing) or “high-risk” (cancer-causing), based on whether they put a person at risk for cancer. In 90% of cases, the body’s immune system clears the HPV infection naturally within two years. This is true of both high-risk and low-risk types.

Genital warts usually appear as small bumps or groups of bumps, usually in the genital area. They can be raised or flat, single or multiple, small or large, and sometimes cauliflower shaped. They can appear on the vulva, in or around the vagina or anus, on the cervix, and on the penis, scrotum, groin, or thigh. Warts may appear within weeks or months after sexual contact with an infected person. Or, they may not appear at all. If left untreated, genital warts may go away, remain unchanged, or increase in size or number. They will not turn into cancer.

Cervical cancer does not have symptoms until it is quite advanced. For this reason, it is important for women to get screened regularly for cervical cancer.

Other less common HPV-related cancers, such as cancers of the vulva, vagina, anus and penis, also may not have signs or symptoms until they are advanced.

Mode of Transmission

Genital HPV is passed on through genital contact, most often during vaginal and anal sex. A person can have HPV even if years have passed since he or she had sex. Most infected persons do not realize they are infected or that they are passing the virus to a sex partner.

Very rarely, a pregnant woman with genital HPV can pass HPV to her baby during vaginal delivery. In these cases, the child may develop warts in the throat or voice box – a condition called recurrent respiratory papillomatosis (RRP).
Diagnosis:

The HPV test on the market is only used as part of cervical cancer screening. There is no general test for men or women to check one’s overall “HPV status.” HPV usually goes away on its own, without causing health problems. So an HPV infection that is found today will most likely not be there a year or two from now. For this reason, there is no need to be tested just to find out if you have HPV now. However, you should get tested for signs of disease that HPV can cause, such as cervical cancer.

Genital warts are diagnosed by visual inspection. Some health care providers may use acetic acid, a vinegar solution, to help identify flat warts. But this is not a sensitive test so it may wrongly identify normal skin as a wart.

Cervical cell changes (early signs of cervical cancer) can be identified by routine Pap tests. The HPV test can identify high-risk HPV types on a woman’s cervix, which can cause cervical cell changes and cancer.

As noted above, there is currently no approved test to find HPV or related cancers in men. But HPV is very common and HPV-related cancers are very rare in men.

Treatment

There is no treatment for the virus itself, but a healthy immune system can usually fight off HPV naturally. There are treatments for the diseases that HPV can cause:

Visible genital warts can be removed by patient-applied medications, or by treatments performed by a health care provider. Some individuals choose to forego treatment to see if the warts will disappear on their own. No one treatment is better than another.

Cervical cancer is most treatable when it is diagnosed and treated early. There are new forms of surgery, radiation therapy, and chemotherapy available for patients. But women who get routine Pap testing and follow up as needed can identify problems before cancer develops. Prevention is always better than treatment.

Prevention

A vaccine can now protect females from the four types of HPV that cause most cervical cancers and genital warts. The vaccine is recommended for 11 and 12 year-old girls. It is also recommended for girls and women age 13 through 26 who have not yet been vaccinated or completed the vaccine series.

For those who choose to be sexually active, condoms may lower the risk of HPV, if used all the time and the right way. Condoms may also lower the risk of developing HPV-related diseases, such as genital warts and cervical cancer. But HPV can infect areas that are not covered by a condom—so condoms may not fully protect against HPV. So the only sure way to prevent HPV is to avoid all sexual activity.
Syphilis

Syphilis (pronounced SIF-uh-lus) is a sexually transmitted disease caused by bacteria. The highly infectious disease may also be passed, but much less often, through blood transfusions or from mother to fetus in the womb. Without treatment, syphilis can cause irreversible damage to the brain, nerves, and body tissues.

The symptoms of syphilis can mimic many diseases. Sir William Osler stated, "The physician who knows syphilis knows medicine."

Causative agent

Syphilis is an infectious, often sexually transmitted, disease caused by the bacteria Treponema pallidum. The bacteria penetrate chafed skin or the mucous membranes.

Mode of Transmission

- Person comes into contact with lesions on an infected person through sexual activity.
- Through blood transfusions
- From mother to fetus in the womb (transplacental)
- Men are more vulnerable to contracting syphilis than women.
- The active disease is found most often among men and women aged 15-39 years.
- Anyone who touches an infected sore.

Symptoms

Syphilis may progress through 3 distinct stages. Sometimes not all 3 may be evident.

Primary phase: The primary phase usually starts with a sore at the site of infection. The sore or lesion is called a chancre (pronounced shanker). This sore usually appears as a craterlike lesion on the male or female genitals, although any part of the body is at risk. Anyone who touches an infected sore can transmit the infection. This initial lesion develops 3-4 weeks after infection and heals spontaneously after 1 week. Though the sore goes away, the disease does not. It progresses into the secondary phase.

Secondary phase: The secondary phase may develop 4-10 weeks after the chancre. This phase has many symptoms, which is why syphilis is called the great pretender. It may look like a number of other illnesses. This phase of syphilis can go away without treatment, but the disease then enters the third phase. These are the most frequently reported symptoms of the secondary phase:

- Fever
- Joint pain
- Muscle aches
Sore throat
Flu like symptoms
Whole-body rash (usually involving the palms and soles)
Headache
Decreased appetite
Patchy hair loss
Swollen lymph nodes

Latent (dormant) phase: The early latent phase (first 1-2 years) is characterized by occasional relapses back to symptoms of the secondary phase of syphilis. More than 2 years after the start of the latent phase, you may have no symptoms and are generally not infectious. However, you can still transmit the infection from mother to fetus or through blood transfusions.

About a third of people with latent syphilis will progress after many years (or decades) into tertiary syphilis. During this phase, the heart, brain, skin, and bones are at risk. Luckily, with the advent of penicillin, this phase is very rarely seen today.

Congenital syphilis occurs after a fetus is infected in the womb. This form of syphilis causes teeth abnormalities, bone problems, liver/spleen/kidney enlargement, brain infection, failure to thrive/poor growth, swollen lymph nodes, yellow skin (jaundice), low blood counts, and skin rashes.

Treatment

Only antibiotic therapy will treat this infection. You must seek medical care for this disease. E.g: Penicillin. During the primary, secondary, and early latent phases of syphilis, a single injection of penicillin cures the disease. People who are allergic to penicillin (and not pregnant) may be given oral antibiotics (such as doxycycline, tetracycline, or erythromycin) for 2 weeks.

Prevention

- While abstinence from any sexual activity is very effective at helping prevent syphilis, it should be noted that T. pallidum readily crosses intact mucosa and cut skin, including areas not covered by a condom.
- Proper and consistent use of a latex condom may be effective against the spread of syphilis through sexual contact, although this cannot be guaranteed due to the ease with which non-genital body parts can be infected.[30]
- Patient education is important as well about the modes of transmission and how to avoid infecting others and how to protect them.
- Counseling of person found to be antibody positive.
- Screening of blood and their products.
Chlamydia

Chlamydia is a bacterial infection disease transmitted when people have sexual relations. It is the most common sexually transmitted disease (STD) in the United States.

Causative agent

Chlamydia is an infection caused by the bacterium Chlamydia trachomatis.

Mode of transmission

- From one person to another by close personal contact such as through sexual intercourse (not by casual contact such as a handshake).
- From mother to child with passage of the child through the birth canal. Chlamydia can cause pneumonia or serious eye infections in a newborn, especially among children born to infected mothers in developing countries.

Risk groups

- Young adults
- People living in urban areas
- Those with lower social and economic status

Symptoms

Women

- No symptoms in 70-80% of cases (One study found that 3% of a sample of young adults 18-35 years had untreated Chlamydia.)
- Bleeding after sexual relations or between menstrual periods
- Lower abdominal pain and burning pain during micturation.
- Discharge from the vagina

Men

- Like women, men who are infected may not show symptoms. Estimates of those with no symptoms range from 25% to 50% of infected men.
- Discharge from the penis
- Pain, burning during micturation.
- Inflammation or infection of a duct in the testicles, tenderness or pain in the testicles
Chlamydia infections can develop into serious medical conditions if not treated.

Women: Pelvic inflammatory disease is a serious medical condition, which can lead to sterility. Fever, abdominal pain, and vaginal discharge can be symptoms of this disease. Women with these symptoms need to go to a hospital's emergency department immediately for treatment.

Men: Fever, discharge from the penis, and painful urination may signal an infection, which may involve inflammation of the testicles. Men with these symptoms need to go to a hospital's emergency department immediately for treatment.

Treatment

The doctor may prescribe a single-dose antibiotic, such as azithromycin (Zithromax), taken as a pill. On the other hand, the doctor may choose an antibiotic, such as doxycycline (Atridox, Bio-Tab), to be taken as a pill twice a day for a week. Up to 95% of people will be cured after one course of antibiotics.

Prevention

- Use latex condoms when having sexual intercourse.
- Avoid sexual contact with high-risk partners.
- Treat infected sexual partners or have them tested before having sexual relations. Up to one-fourth of sexual partners will be reinfected because the partner wasn't treated.
Gonorrhea

Gonorrhea is one of the most common diseases passed from one person to another during sexual activity.

Causative agent

Gonorrhea is caused by the Neisseria gonorrhoeae bacteria.

Risk groups

- Adolescents and young adults
- People (often poor) living in urban areas and Southern states
- Drug users

Mode of Transmission

- The infection is transmitted from one person to another through vaginal, oral, or anal sexual relations.
- Men have a 20% chance of getting the infection by having sexual relations with a woman infected with gonorrhea.
- Women have a 50% chance of getting the infection by having sexual relations with a man infected with gonorrhea.
- An infected mother may transmit gonorrhea to her newborn during vaginal childbirth.
- Common use of victim’s materials

Symptoms

Symptoms may appear within 2-10 days after exposure to an infected person—even longer for women (up to 3 weeks).

Women

- No symptoms 30-40% of the time
- Infection and irritation of the cervix
- Need to urinate often
- Itching and burning of the vagina, usually with a thick yellow/green discharge
- Gonorrhea may cause pelvic inflammatory disease (a serious medical condition that can lead to infertility)
- Infection and irritation of the vagina (this is how the infection usually appears in children who may be victims of incest)
- Bleeding during menstrual periods
Men

- Pain or burning during urination in most men
- Thick, yellow penile discharge 50% of the time
- Inflammation or infection of a duct in the testicles
- Infection or inflammation of the prostate

Newborns

Irritation of the mucous membranes in the eyes (if not treated, can cause blindness)

Treatment

Previously, a class of antibiotics known as the fluoroquinolones [examples are ciprofloxacin, ofloxacin (Floxin), and levofloxacin] was widely used in the treatment of gonorrheal infection. Because of increasing resistance of many tested samples of N. gonorrhoeae to the fluoroquinolone drugs, the CDC now recommends that only one class of antibiotics, the cephalosporin, be used to treat gonorrheal infection.

Prevention

- Use latex condoms when having sexual intercourse.
- Avoid sexual contact with high-risk partners.
- Treat infected sexual partners or have them tested before having sexual relations.
- Other sexually transmitted diseases include syphilis, Chlamydia, and HIV/AIDS.
Genital Herpes

Genital herpes is a common, highly infectious disease caused by a virus. It is transmitted from one person to another during sexual activity. Genital herpes causes blisters or groups of small ulcers (open sores) on and around the genitals in both men and women. It cannot be cured, only controlled.

Genital herpes is extremely widespread, largely because it is so contagious. Carriers can transmit the disease without having any symptoms themselves of active infection.

Causative agent

Genital herpes is caused by the herpes simplex virus (HSV). There are two types: HSV-1 and HSV-2. Most genital herpes infections are caused by HSV-2. HSV-1 is the usual cause of what most people call "fever blisters" in and around the mouth and can be transmitted from person to person through kissing. Less often, HSV-1 can cause genital herpes infections through oral sexual contact. The genital sores caused by either virus look the same.

Risk groups

- The poor,
- Those with less education,
- Those using cocaine, and
- Those with many sexual partners.

Mode of Transmission

- By direct contact with an infected person.
- Sexual intercourse and oral sex are the most common methods of spreading genital herpes.
- Any type of skin-to-skin contact

Note: People with herpes may spread the disease even if they do not realize they have an infection. Furthermore, there is strong evidence that people with herpes can transmit infection even while their disease appears to be inactive and no sores can be seen.

Symptoms

Signs of herpes tend to develop within 3-7 days of skin-to-skin contact with an infected person. Herpes infections look like small blisters or ulcers (round areas of broken skin) on the genitals. Each blister or ulcer is typically only 1-3 millimeters in size, and the blisters or ulcers tend to be grouped into "crops." Usually the blisters form first, then soon open to form ulcers. Herpes infections may be painless or slightly tender. In some people, however, the blisters or ulcers can be very tender and painful.
First outbreak of genital herpes

- The first herpes outbreak is usually the most painful, and the initial episode may last longer than later outbreaks.
- Some people develop other signs of herpes infection, particularly with the first episode.
- Fever
- Muscle aches
- Headaches (may be severe)
- Vaginal discharge or painful urination
- Swollen and tender lymph glands in the groin (these glands swell as the body tries to fight the infection)

Later outbreaks of genital herpes

If the disease returns, later outbreaks generally have much less severe symptoms. Many people with recurrent disease develop pain or a tingling sensation in the area of the infection even before any blisters or ulcers can be seen. This is due to irritation and inflammation of the nerves leading to the infected area of skin.

These are signs that an outbreak is about to start. You are particularly contagious during this period, even though the skin still appears normal.

Diagnosis

- Swabs for culture
- Electron microscopy
- Specific antibodies.

Treatment

- currently no cure
- antiviral medications
- Reduce the frequency, duration, and severity of outbreaks. (Docosanol a cream, Aciclovir a drug)

Prevention

Vaccine: Zostavax
Prevention and control of Reproductive Tract Infections

- The same precautions against spreading infection — universal precautions — should be used with all patients whether they appear sick or well, and whether or not you know their HIV or other infection status.
- A number of RTIs can be spread from patient to health care provider or to other patients if basic precautions are not followed. Hepatitis B and C viruses and HIV are incurable infections that are easily transmitted by reuse of contaminated sharps. Because RTIs are often asymptomatic, it is not possible to know which patients have an infection. For this reason, universal precautions should be followed for all patients regardless of known or suspected infection status.
- Use precautions with every person you see. Every time you have to cut the skin or touch body fluids, follow the advice below. This includes any time you must give an injection, stitch skin or tissue, help with childbirth, or examine a woman’s vagina.
- If you follow these rules, there is no risk of spreading infection from one person to others, or of being infected yourself.
- Avoid touching body fluids, such as blood, vomit, stool and urine.
- Do not share anything that touches blood. This includes razors, needles, any sharp instruments that cut the skin, and toothbrushes. If you must share such things, disinfect them before another person uses them.
- Keep wounds covered with a clean bandage or cloth.
- Use gloves or a piece of plastic to handle dirty bandages, cloths, blood, vomit or stool.
- Wash your hands with soap and water after changing dirty bedding and clothes.
- Keep bedding and clothing clean. This helps keep sick people comfortable and helps prevent skin problems. Handle clothing or sheets stained with blood, diarrhea or other body fluids carefully. Separate from other laundry for washing. Dry laundry thoroughly in the sun if possible or iron after drying.
Mental Health and Drug Abuse

Mental health is a term used to describe either a level of cognitive or emotional well being or an absence of mental disorder. Mental health is the balanced development of the individual’s personality and emotional attitude which enable him/her to live harmoniously with his/her fellowman including community, society, social institutions, etc.

Characteristics of a mentally healthy person

- He feels comfortable about himself i.e. he feels reasonably secure and adequate.
- He neither underestimates nor overestimates his own ability.
- He accepts his shortcomings, he has a self respect.

Warning signals of poor mental health

William C. Menninyer President of the Menninyer Foundation Topeka, Kansas, United States of America drew up the following questions to aid in taking one’s own mental health pulse.

- Are you always worrying?
- Are you unable to concentrate because of unrecognized reasons?
- Do you lose your temper easily and often?
- Do you continuously dislike to be with people?
- Are you afraid without real cause?
- Do you feel you are always right and other people always wrong?
- Do you have numerous aches and pains for which no doctor can find a physical cause?

The conditions chartered in these questions are the major warning signals of poor mental health.

Mental Illness

It is a vast subject broad in its limits and difficult to define precisely. Almost everyone has periods when they feel anxious, depressed, unreasonably angry or inadequate in dealing with life’s complexities due to varieties of reasons.
Features of mental illness

- Disturbances in bodily function
  - Sleep
  - Appetite and food intake
  - Bowels and bladder movement
- Change in the mental function
  - Behavior
  - Talk
  - Emotions
  - Memory
- Changes in individual and social activities
  - Individual
  - Social

Type of Mental Illness

Major Mental Illness (Psychosis)

Major illness is also called psychosis. Here, the person is ‘insane’ and out of touch with reality. It is of three types;

- Schizophrenia (split personality)

It is a serious mental illness in which some one’s thought and feelings are not based on what is really happening around them. Or the patient lives in a dream world of his own.

- Manic depressive psychoses

The symptoms vary from heights of excitement to depths of depression.

- Paranoia

It is associated with undue and extreme suspicion and a progressive tendency to regard the whole world in a framework of delusion.
Minor Mental illness

Minor illnesses are two types;

- Neurosis or psychoneurosis
  
  In this the patient is not able to react normally to life situations. He is not considered ‘insane’ but exhibits certain peculiar symptoms such as morbid fear, compulsion.

- Personality and character disorders
  
  This group of disorder is the legacy of unfortunate childhood experiences and perceptions.

Cause of mental illness

Mental illness is due to multiple causes. There are many known factors of agent, host and environment in the natural history of mental disorders. Among the known illness factors are the following:

- Organic conditions: neoplasm, metabolic neurological)
- Diseases and chronic diseases such as epilepsy, leprosy etc.
- Heredity
- Social pathological causes like emotional stress, economic insecurity, poverty, rejection, etc.
- Environmental factors:
  - Toxic substance
  - Nutritional factors
  - Traumatic factors
  - Radiation
  - Psychotropic drugs

Preventive aspects of mental illness

- Primary (on a community basis)

It operates on community basis. This consists of improvement and promotion of the social environment and promotion of the emotional and physical well being of all the people.
• Secondary

Early diagnosis of mental illness and of social and emotional distribution through screening programs in school, university, industry, recreations centers provision of treatment facilities and effective community resources. Counseling plays vital role in this level.

• Tertiary

Tertiary prevention seeks to reduce the duration of mental illness and thus reduced the stresses they create for the family and the community. In short, the goal at this level is to prevent further break down and disruption.

• Mental health services

Mental health services in a community are concerned not only with early diagnosis and treatment but also with the preservation and promotion of good mental health and prevention of mental illness. The mental health services comprise:

- Mental health education
- Use of modern psychoactive drugs
- Group and individual psychotherapy
- After care services
- Rehabilitation
**Drug abuse**

Drug is any substance that when taken into the living organism or when used brings change in individuals”. *(Oxford Dictionary)* Drug abuse is define “as self-administration of a drug for non medical reasons in quantities and frequencies which may impair an individual ability to function effectively and which result in social, physical and emotional" *(Oxford Dictionary)*

**Agent factors**

- Alcohols
- Opioids
- Cannabis
- Tobacco
- Volatile solvents
- Sedative or hypnotics

**Factors associated with a high risk for drug abuse**

- Unemployment
- Living away from home
- Relaxed parental control
- Alienation from family
- Early exposed to drug
- Leaving school early
- Area where drug are sold, trade, or produced
- Areas with high rates of crime
- Certain occupation(tourism, drug production or sale)

**Symptoms of drug addiction**

- Loss of interest in sport and daily routine.
- Loss of appetite and body weight
- Acute anxiety, depression, profuse sweating
- Changing mood, temper, tantrums
- Drowsiness or sleeplessness, lethargy and passivity
- Nausea, vomiting and body pain
- Slurring of speech
- Impaired memory and concentration
- Redding and puffiness of eyes, unclear vision
Prevention

- Legal approach
  - Legal control on the distribution of drug
  - Controls may be designed to impose partial restriction.
  - Legislation may be direct at controlling the manufacture, distribution, prescription, price time of sale or consumption of a substance.

- Educational approach
  - Prevention of drug use and related problems
  - Common approaches have included educational program for school health children and public information campaigns on electronic media.
  - General Principal of communication can be applied to increase the effectiveness of educational approach.

- Community approach
  - Non-medical use of the drugs in individually as well as in its mass appearance involves a complex interaction of drug, men and his environment, including social, economical, culture, political and other elements of varying character and strength.

Treatment

- Rehabilitation
  - Facilities for vocational training and sometimes the provision of sheltered work opportunities are useful in rehabilitation and help to prevent relapse.
References:


