

As Per New Syllabus ER 20
Diploma in Pharmacy 1st Year
Social Pharmacy
Notes



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Chapter 1

Introduction to Social Pharmacy

Topics

Introduction to Social pharmacy

Dimensions of health

Determinants of health

Health Indicators

National health Policy 1983,2002,2017

Millennium Development Goals

Sustainable Development Goals

FIP (INTERNATIONAL PHARMACEUTICAL
FEDERATION) DEVELOPMENT GOALS


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Introduction to Social pharmacy

- The discipline that deals with the medicinal role by considering the social, scientific and humanistic perceptions.
- It includes health psychology and all the social factors influencing the use of medicines (eg. Medicine related brief , regulations, medicine information etc

Scope of social pharmacy in improving public health

- The information present in social pharmacy is very important to link the clinical and fundamental knowledge to the pharmacist
- A proficient pharmacist is certified to incorporate his/her knowledge and social / communication skills for improving patient's behaviour , treatment outcomes and disease management .

Role of pharmacist in public health

- ❖ They Provide population based care.
- ❖ They conduct diseases prevention & control program in their institution and communities
- ❖ They develop health education policy and program
- ❖ They contribute in health promotion and education
- ❖ They participate in formulation of drug policy

Concept of health

Health : According to the world health organization.

“A state of complete physical, mental, & social well being And not merely an absence of diseases”

National health Programme was declared by the indian government in 1983 with the aim

- To provide proper health service for checking infection disease
- To provide proper treatment in rural and sub-rural areas
- To conduct Vaccination programme

Dimensions of health

- Health is complex as it involves various factors, The world health organisation in 1948 recognised some parameters for measuring an individual's functionality
- Physical, social, and mental dimensions were the three measure identified initially while emotional , spiritual , and environmental dimension identified lately

1. Physical health

- Physical health is defined as a state indicating perfect functioning of the body.
- In biological terms, health can be defined as a state in which body cells and organs are functioning properly.
 - I. Clean skin
 - II. Bright eyes

III. Proper bereath etc

- Smooth and easy coordinated movements are the sign of physical health.
- In an individual the size and functioning of all the organs should be normal.

2. Mental health

- Mental health is defined as a state of balance between the individual and the surrounding world including the environment
- The characteristics of an individual who is mentally fit.
 - The individual should have no internal conflicts.
 - The individual should be well adjusted with the surrounding.
 - The individual should know himself, his needs, problems and goals.
 - The individual should have a good self control.
 - The individual on facing problem should try to solve them intelligently.

3. Social health

- ✚ Social health is defined as a quantity and quality of an individual inter personalities and the extent of involvement with the community.
- ✚ Social health indicates harmony and intergration with in the individual between the individual and other member of society.
- ✚ Development good social skills improve an individual's relationship with other people helps in making friends helps in career and also to live independently in adult life.

4. Spiritual health

- ◆ Spiritual health is defined as a personal matter involving value and beliefs providing a purpose in an individual's life.

5. Emotional health

- Mental and emotional dimensions were seen one in the same thing but as more research becomes available a definite difference is emerging mental health can be seen as "knowing"
- "cognition", while emotional health refer to "feeling"

Determinants of health

- The factor influencing of the health are known as the determinants of health
- Health and social services contribute to health while the main
- Health determinants eg. Education, employments, housing and environment are not directly influenced by health and social care
- The world health organisation has identified the some determinants of health

1. Income and social status :

- As the income and social hierarchy increase the health of an individual improves Living conditions like safe housing and ability to buy good food are determined by high income.

2. Employment :

- Poor health arises due to unemployment, underemployment and working under stressed condition. Such individual also live longer in comparison to those who have stressed.

3. Education :

- Health of an individual is also determined by the education level. Education also increases opportunities for income and job security and provides with a sense of control over life circumstances. Poor health, more stress, and low self-confidence often result due to low education levels.

4. Social environment :

- Values and norms of a society also affect an individual's health and well-being in different ways. Social stability, diversity recognition, safety, good working relationships also establish a supportive society that reduces or avoids the potential risks to good health.

5. Physical environment :

- Air and water quality are the physical factors in the natural environment which put their impact on health.

6. Healthy child development :

- The effect of pre-natal and early childhood experiences has a very powerful impact on health and well-being. Children born in families having low income have low birth weight, eat less nutritious food and have more difficulty in school with comparison to those born in families having a high income.

7. Social support network :

- A better health results from support provided by families, friends, and communities.

8. Gender :

- Men and Women at different ages suffer from different types of diseases.

Health Indicators

→ A characteristic of an individual, population, or environment which is measured either directly or indirectly, and is used for describing any health features of the individual or population is termed a health indicator.

The status of a health can be measured using the following indicators

1. Mortality Indicators : This includes

- **Crude Death rate** : It is the number of deaths per 1000 population per year in a community
- **Life expectancy** : It is the average number of the years a new-born will live in a population
- **Child Mortality rate** : It is the number of deaths of 1-4 years old children in a given year per 100 children of the same age group at the mid-point of the same year
- **Under 5 proportionate Mortality Rate** : It is the proportion of total deaths of children below 5 years of age
- **Maternal Mortality rate** : It is the proportion of deaths of women of reproductive age in most of the developing countries

2. Morbidity Indicators :

- These indicators are used for improving the mortality data so that the health

status of a population can be properly described.

3. Born with Nutritional Status Indicators :

- Health and weight of children at school entry & the low birth weight (less than 2.5 kg).

4. Indicators of social and mental Health :

- There are the rates of suicides , alcohol & drug abuse Smoking, road traffic accidents etc.
- These Indicators provides guidance for social action, in improving the health status.

National health Policy

- A national strategy for controlling and optimising the social use of its health knowledge of proposed objectives is called health policy
- According to WHO, **“Health policy is defined as decisions, plans, and actions that are undertaken to achieve specific health care goals within a society”**

National health policy 1983

- The ministry of health and family welfare of government of India evolved a National health policy in 1983.
- In 1983 , India got its first National health policy after 36 years of Independence.
- Salient features of 1983 health policy.
- It focuses on preventive & promotive Primary health care approach the government's responsibility.
- It was important for the curative – oriented western model of health care.

National health policy 2002

- ❖ Government of India introduced a revised health policy.
- ❖ National health policy in 2002 to carry out better health care and incomplete goals. According to this revised policy government and health professionals are forced to provide good health care to the society.
- ❖ The NHP 2002 leads to enhance the use of health service to a large group rather than a small group

Objective

- To ensure equal availability to health service across the social and geographical expanse of India.
- To increase the contribution of private sector in facilitating health service for people who can afford to pay.
- To spread out public health system by improving the infrastructure in existing institutions.
- To carry out a sustainable standard of good health of population.
- To enhance approaches for tried system of Traditional medicine.

National health policy 2017

- ◆ On 15th march, 2017 the ministry of health and family welfare established the national health policy 2017.
- ◆ The main aim of the policy is to focus on “ Sickcare “ to “ Wellness “

Seven priority areas are also identified by NHP 2017 for improving the environment for health

- I. The swachh bharat Abhiyan
- II. Balanced, healthy diets and regular exercises
- III. Addressing tobacco, alcohol & substance abuse
- IV. Yatri suraksha : preventing deaths due to rail and road traffic accidents
- V. Nirbhaya nari : Action against violence
- VI. Reduce stress and improved safety in the work place
- VII. Reducing indoor and outdoor air pollution

Objective

- To increase public health care investment from 1.4 % to 2.5 % of GDP with more than two –third of those resources going towards primary health care.
- To provide a larger package of comprehensive primary healthcare through Health and Wellness Centres.
- To suggest free diagnostics, drugs, emergency health care service in all public hospitals.
- To make sure that the 2 beds per 1000 population are easily available within golden hours.

Millennium Development Goals



The MDG are eight goals to be achieved by 2015 that respond to the world's main development challenges and signed under the United Nations Millennium Declaration in Sep 2000



All the 191 United Nations member states have agreed to achieve their MDGs by the year 2015

8 Millennium Development Goals

- To achieve universal Primary education
- To promote gender equality and empower women
- To reduce child mortality
- To eradicate extreme poverty and hunger
- To improve maternal health
- To combat HIV/AIDS, malaria, and other diseases
- To ensure environmental sustainability
- To develop a global partnership for development

Sustainable Development Goals

- The United Nations Sustainable Development Goals also known as the global goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace

Targets of SDG by the year 2030

- To decrease the global material mortality rate to less than 70 per 100000 live birth
- To end the epidemis of AIDS, Tuberculosis, Malaria etc
- To reinforce prevention and treatment of substance abuse, comprining narcotic drugs abuseand harmful use of alcohah
- To confirm universal access to sexual and reproduction heaqlth care service for family planning , information & education of reproduction health into national strategies andprogrammes

17 Sustainable Development Goals

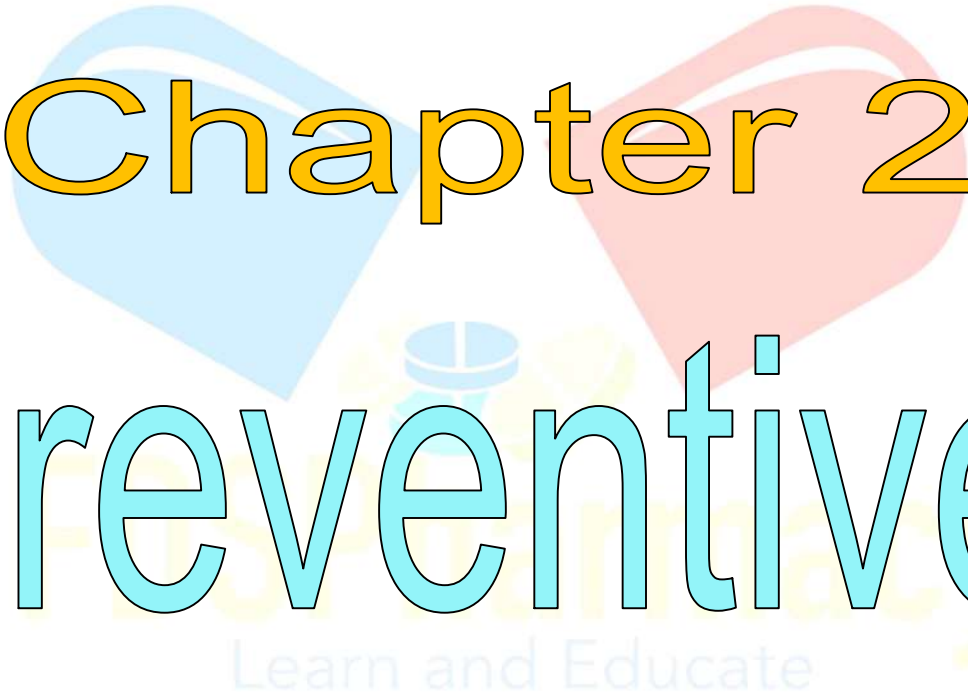
1. No poverty
2. Zero hunger
3. Good health and well-being
4. Quality education
5. Gender Equality
6. Clean water and Sanitation
7. Affortable And Clean Energy
8. Decent Work and economic growth
9. Industry, Innovation and Infrastructure
10. Reducing Inequality
11. Sustainable Cities and communities
12. Responsible consumption and production
13. Climate action
14. Life below water
15. Life on land
16. Peace, Justice and Strong Institution
17. Partnership for the goals

FIP (INTERNATIONAL PHARMACEUTICAL FEDERATION) DEVELOPMENT GOALS

- The FIP Development goals are a major global initiative in the pharmacy field
- There were formed on the innovation responsible for the launch of FIP Pharmaceuticalworkforce Development Goals (PWDG's)in nov 2016

FIP Development Goals

1. Academic capacity
2. Early Career Training Stretegy
3. Quality Assurance
4. Advanced and Specialist Development
5. Competency Development
6. Leadership Development
7. Advancing Integrated services
8. Working With Other
9. Continuing Professional Development
10. Equity and Equality
11. Impact and outcomes
12. Pharmacy Intelligence
13. Policy development
14. Medicines Expertises
15. People Centred Care
16. Communicable Diseases
17. Antimicrobial Stewardship
18. Access to Medicines , Device ans services
19. Patient Safely
20. Digital Health
21. Sutainability in Pharmacy



Chapter 2

Preventive

Healthcare

Topics

Demography

Family Planning

Mother and child health

Breast Feeding

IMMUNITY

IMMUNISATION

EFFECT OF ENVIRONMENT ON HEALTH

Sewage



Preventive Healthcare

Demography

The study of human population their composition, distribution and size, and cause and consequences of any changes in there characteristics is termed demography

Or

It can also be defined as the statistical study of population which involves studing the structure, size,and distribution of population

- Demography is a branch of economic or sociology
- Demography is scientific study of human population

Demography include

- Population distribution in space
- Change in population size
- Population composition

Four demography process

- Fertility
- Mortality
- Marriage
- social mobility

Demography cycle

- The demography cycle is followed throughout the world. The stage of demography cycle under go variation in different countries based on their population growth and industrialization
- After studying the statistical population growth data of various countries it has been concluded that the demography cycle comprises of five stage of population growth

Stage of demography cycle

First stage High stationary stage : High birth and high deaths rates are the characteristics feature of this stage. The birth and death rates act with respect to each other in a specific position so that the population remain stable.

Second stage Early Expanding stage : Declining death and constant birth rate are the characteristics feature of this stage.

Third stage Late expanding stage : Further declining death and falling birth rate are the characteristics feature of the stage. The population grows continuously during this stage because the no of birth exceeds the death.

Fourth stage Low stationary stage : Low birth and low death rates are the characteristics feature of this stage thus the overall population remain constant.

Fifth stage Declining stage : Low birth rate than a death rates is the characteristics feature of this stage Thus the population starts declining.

Family Planning

- An expert committee of the WHO defined family Planning in 1971 as
- “A way of thinking and living adopted voluntarily on the basis of knowledge, Attitude, and responsible decision by individual and couples in order to promote health and welfare of the family group and thus contribute effectively to the social development of a country”

Objective

- To avoid unwanted birth,
- To bring about wanted birth,
- To regulate the intervals between each pregnancy,
- To control the time at which birth occur in relation to the parents age
- To determine the no of children in a family

There are many method through which unwanted pregnancy can avoid Contraceptive method

- Many scientifically tested and reliable contraception method are available which helps a couple to avoid unwanted pregnancies.
- A gynaecologist should be consulted with before adopting some of there

Family Planning method

The family Planning or contraceptive method prevent the sperm to fuse with the ova released and thus avoid pregnancy

The various birth control method available at present are

- Behavioural method
- Natural method
- Chemical method
- Mechanical method
- Hormonal contraceptives method
- Terminal method
- Post conceptional method

1. Behavioural method

- ☆ **Coitus interruptus** : This is the oldest method of voluntary fertility control in which the male withdraw before ejaculation This prevent semen deposition into the vagina.
- ☆ **Safe period or calendar method** : In this the couples should avoid intercourse during the period This method however is not reliable because a woman's menstrual cycle may vary only educated and responsible couples can use this method effectively.
 - ➔ Day 1-5 denote the menstruations days
 - ➔ Day 6-9 denote safe period in which conception can't occur
 - ➔ Day 10-18 denote unsafe period in which conception can occur
 - ➔ Day 19-28 denote safe period in which conception can't occurs

2. Natural family planning method

- Is a form of birth control that doesn't involve pills or device. As a result it doesn't have side effects. With this method you track your fertility.
- Which is when you are most likely to get pregnant.
- The ovaries release an egg at about the same time each month that's called ovulation. The egg moves through the fallopian tube towards the uterus. An unfertilised egg can live up to 24 hours.
- Fertility happens for about 6 days each month: 5 before ovulation and the day of ovulation.

Natural family planning uses different methods to pinpoint those fertility days

Basal body temperature (BBT) method

- At the time of ovulation the basal body temperature rises by 0.3-0.5 °C.
- This is because the production of progesterone at this time increases so the temperature should be measured in the morning before getting out of bed.

Cervical mucus method / Ovulation method

- With the beginning of ovulation the cervical mucus becomes watery, clear like the raw egg white, smooth, slippery. After ovulation it becomes thick and also its quantity decreases.

3. Chemical method

- Chemical method utilises chemical contraceptive in which a base with incorporated spermicide is present.
- Surface active agents are the commonly used spermicide. These agents, on coming in contact with the sperm deposited in the vagina during intercourse, inhibit their ability of oxygen uptake and kill them.
- The spermicides should be introduced in the vagina 15 mm before the intercourse.

The chemical method of family planning involves the use of

1. Foam tablets : The tablets are inserted by the woman into her vagina before the intercourse. The tablets produce foam after insertion. This foam forms a protective coating to the whole area, kills the sperms released in the vagina during intercourse and thus prevents pregnancy.

2. Spermicidal jellies / creams / pastes : These are applied in the vagina with the help of an applicator. They destroy the sperm in the vaginal canal.

The effectiveness of spermicidal creams is prominent only when used along with a diaphragm or condom.

Drawbacks

- ✗ As it is a coitus-related procedure, many couples find them difficult to use.
- ✗ Causes mild burning or irritation.
- ✗ Not fully effective unless used along with another barrier method.

4. Mechanical method

- There are many devices available which can be suitably used by both men and women
- This method aim to prevent the meeting of sperm with the ovum
- These methods do not produce any side effects provide protect against sexually transmitted disease and also protect from the risk of cervical cancer due to this reason the mechanical method of contraception are popular

❖ **Candom or Nirodh** : It is a very thin rubber sheath used by the male

The Indian government has introduced three brands of Nirodh

- Dry Nirodh
- Deluxe Nirodh a lubricanted candom
- Super Deluxe Nirodh

Advantages

- ✓ Simplest, most effective, easily available
- ✓ Easy to use, do not require medical supervision or consultation
- ✓ Do not produce any side effects

Provide protection against sexually transmitted disease etc

Disadvantages

- ✗ In rare cases either the male or female are sensitive to rubber
- ✗ They may tear off or slip during intercourse
- ✗ A few couples may feel that the rubber sheath interfere with their natural sexually sensation

❖ **Diaphragm**

It is a thin, shallow, dome shaped rubber cap fitted with a spring in its ring It is of 5-10 cm diameter and it is inserted in the vagina before intercourse it should remain in its place for at least 6 hours after the intercourse It is a vaginal barrier which prevents pregnancy

Advantages

- ✓ It does not interfere with sexual activity
- ✓ Does not produce any side effects

Disadvantage

- ✗ Sometimes either the male or female be sensitive to rubber
- ✗ It should be used properly other wise the failure rate may be quite high

❖ **Intra uterus device IUDs**

- These devices fitted in the uterus for preventing pregnancy They are available in medicated and non-medicated types which are made up of polyethylene
- The medicated IUDs release either metal ions eg copper Or hormones eg progestogens
- They reduce side effects and enhance the contraceptive effective Ness
- The non-medicated IUDs are also known as first generation IUDs

- I. Lippes loop
- II. Copper-T

Advantages

- ✓ Simple device which can be inserted by the woman himself at home
- ✓ They do not produce any systemic side effects
- ✓ Their failure rate is negligible

Disadvantage

- ✗ This method is not advised for delaying the first pregnancy
- ✗ In some cases heavy bleeding have been reported

5. Hormonal contraceptives

→ Hormonal contraceptives are the most effective contraception method pregnancy can be 100% preventer by using the combined oral contraceptives pills COCPs

➤ Oestrogen – progestin combination combined oral contraceptives pills

- It is the most successful contraception method
- Most of the currently available formulation of combined pills contain a synthetic oestrogen 30-35 ug and a progesterone 0.5-1.0 mg
- The pill is orally administered for 21 days, starting from the 5 day of menstrual cycle followed by a break of 7 days of menstrual cycle
- The pills should not be prescribed if the woman is
 - I. Already pregnant
 - II. More than 35 years
 - III. Diabetic or has a family history of diabetes
 - IV. Has suffered from jaundice in the last 6 months
 - V. Has cancer of breast or genital organs or lactating mother

Advantages

- ✓ It is a reversible contraceptives method
- ✓ It is 100% effective if taken regularly
- ✓ It is not coitus related thus does not interfere with the intercourse activity
- ✓ It corrects any pre existing menstrual problem
- ✓ Because of regular medical check up, possibility of breast cancer and cervical cancer can be early detected

Disadvantage

- ✗ Sometimes irregular vaginal bleeding occurs
- ✗ Weight gain, vomiting, sickness, are some of the side effects which disappear within 3-4 months
- ✗ Women more than 35 years of age can't use this pills

6. Terminal method

- The contraception method discussed above are used for delaying the pregnancy or for maintaining a gap between two child birth but the terminal method are used after the family is complete and the couples wants to end the need for contraceptive or other method
- The following sterilisation operation method of either the male or female provide permanent protection against pregnancy

Vasectomy

- It is performed for the males and is a very simple outpatient surgical procedure of around 20 min
- In this method small cut is made above the men's scrotum on both the side to remove a small portion of the vas deferens
- The cut are tied up
- Vasectomy does not have any effect on the strength or virility of the male
- He ejaculates semen which doesn't contain sperm

Advantages

- ✓ It is a very simple and 100% effective surgical procedure to provide permanent protection against unwanted pregnancy
- ✓ No side effects

Disadvantage

- ✗ In some cases surgical re-canalisation has been successfully done for all practical purposes this method should be accepted as irreversible

Tubectomy

- It is performed for the females after which they have to remain hospitalised for 2-3 days and also take rest for a few days
- In this method a small piece of each fallopian tube is removed and the cut ends are tied up to block the passage of ovum
- As the result the released ova and the sperm will not meet during the intercourse and thus no pregnancy

Advantages

- ✓ Tubectomy provide permanent protection against unwanted pregnancy
- ✓ No side effects

Laparoscopy

- Female sterilisation has been simplified with the use of laparoscope
- To perform this procedure the females need to be hospitalised only for a few hours
- In this method a very small cut is made in the abdomen through which the laparoscope is introduced
- The abdomen is inflated with gas or air

- When the fallopian tubes become visible and accessible they are blocked by applying fallopian rings or clips
- Laparoscopy provides permanent protection against unwanted pregnancy
- No side effects

7. Post conceptional method

- Levonorgestrel either alone or combination with estrogen should be taken orally within 72 hours of unprotected intercourse and repeated after 12 hours
- Nausea and vomiting are the common side effects
- At present 3 regimens of emergency contraception are available

Levonorgestrel (0.5 mg) + ethinylestradiol (0.1 mg) : taken orally within 72 hours of unprotected intercourse and repeated after 12 hours
This regimen is named as the Yuzpe method and is popular
It is highly effective but most of the women experience nausea and vomiting.

Levonorgestrel 0.75 mg : taken twice within 72 hours of unprotected intercourse at intervals of 12 hours. This regimen is 2-3 times more effective and better tolerated. Incidence of vomiting is reduced but it delays the next period.

Mifepristone 600 mg : taken once within 72 hours of unprotected intercourse has a high rate of success and almost negligible side effects. This method has nowadays become prevalent throughout the world.

Role of pharmacist in family Planning

- Exhibiting family Planning posters in hospital and drug store
- Counselling people about the importance of family planning, gap years between two children etc
- Educating about oral contraceptives
- Conducting education programmes that focus on the issue of high population
- Convincing the people about the advantages of having small families
- Advertising programmes
- Giving explanation on the techniques and usage method
- Providing social facilities
- Organising discussion and seminars
- Signifying the relative studies

Mother and child health

- WHO defined maternal health as the health of women during pregnancy, child birth, and postnatal period
- Maternal health comprises of the absence of maternal morbidity, maternal morbidity refers to health situation that complicate pregnancy and childbirth or puts a bad influence on a woman's health and wellbeing

Paediatrics / Child health

The word paediatrics has been derived from the Greek word

Paedia meaning **child**

Iatri meaning **treatment**

Ics meaning **branch of science**

- Paediatrics is the branch of medical science that deals with child development and care and with the disease of child hood and their treatment
- Paediatrics also refer to the complete and continued care of children, in wellness as well as illness
- Abraham Jacob 1830-1919 is the father of paediatrics

Maternal and child health programmes

- According to WHO 1976 maternal and child health MCH
- Service is defined as promoting, preventing, therapeutic or rehabilitation facility or care for the mother and child
- Thus maternal and child health service is an important and essential services related to mother and child overall development

Importance

- ✓ By improving the health of mother and children the health of the family and community can be improved
- ✓ Mother and child below the age 15 years make up the majority of the population in almost countries
- ✓ Ensuring child survival is a future investment for the family and community

Objectives of Maternal and Child Health Programme

- The ultimate objective is to provide life-long health.
- To reduce maternal, perinatal, infant and child mortality and morbidity.
- To promote reproductive health.
- To promote physical and psychological development of the child and adolescent within the family.
- To reduce child death and infant mortality rate
- To provide complete protection of child.
- To provide nutritious diet to children (including treatment and checking of vitamin A deficiency)

- To monitor the overall growth of children.
- To make efforts to preserve and promote the health of children < 5 years of age.
- To increase the health level of children through school health services and other programmes/ agencies

Breast Feeding

During pregnancy, the woman should be ideally counselled on the benefits of breastfeeding. The mother should be provided information on the following:

- ✓ She should initiate breastfeeding especially colostrum feeding within 60 minutes of childbirth
- ✓ She should not give any pre-lacteal feeds.
- ✓ She should make sure the baby is well attached to the breast.
- ✓ She should continue exclusive breastfeeding for six Months
- ✓ She should breastfeed the baby whenever he/she demands milk.
- ✓ She should follow the practice of rooming in.

Initiation of Breastfeeding

→ Breast-feeding should be initiated within 30 minutes of child birth in case of normal delivery and within 4 hours in case of C-section. The mother should breast feed the child up to 2 years or more if the baby wishes

Composition of Breast Milk

- Breast milk is the most suitable, economic, nutritious, sterile, and specific food for infants
- It is also anti infective in nature
- Colostrum is thick, sticky, and pale yellow-coloured milk that is produced for about 5-7 days after the childbirth.
- It is highly rich in antibodies, proteins, minerals, salt, Vitamin A, and thus should be given to the infants.
- It has a very low content of fat and sugar.

Composition of Breast Milk

Nutrients	Mean Value in Breast Milk (100 ml)
Protein	1.3 gm
Fats	4.2 gm
Carbohydrates	7 gm
Sodium	15 mg
Calcium	35 mg
Phosphorus	15 mg
Iron	76 mcg

Vitamin A	60 mcg
Vitamin C	3.8 mg
Vitamin D	0.01 mcg
Magnesium	3.5 mg

Other Vital Components of Breast Milk

- ➔ **Human Milk Oligosaccharides (HMOs):** These are a type of dietary fibre that promotes the growth of healthy bacteria in the infant's stomach. These bacteria aid digestion and regular bowel movements.
- ➔ **Human Milk microbiota :** Some bacteria are found in the breast milk of all mothers; while some are present only depending on the mother's diet, immunity, environment, and lifestyle. These bacteria, on passing from the mothers to their babies, help them in developing their intestinal microbial to fight off infections.
- ➔ **Antibodies or Immunoglobulins:** These are found abundantly in colostrum and boost the baby's immune system.

Importance of Breastfeeding

→ Breastfeeding is beneficial for the infants as well as for the mothers.

Advantages to the Baby

- ✓ It contains the nutrients required by an infant in the first 6 months.
 - a. The most suitable protein and fat.
 - b. More lactose than other milks.
 - c. Sufficient vitamins.
- ✓ It gets easily digested and assimilated.
- ✓ It contains no microbes that may cause diseases.
- ✓ It reduces the occurrence of infections as:
- ✓ It inhibits the growth of harmful bacteria.
- ✓ It contains antibodies against any infection the mother carries.
- ✓ It maintains the right body temperature of the infant.
- ✓ It improves the infant's IQ.
- ✓ It reduces the possibility of developing asthma or allergies.
- ✓ It reduces the risk of heart attacks or diabetes in future life.
- ✓ It facilitates bonding between the infant and mother.
- ✓ It reduces the occurrence of certain cancers.
- ✓ It promotes the proper development of jaw and facial
- ✓ It promotes normal weight gain to prevent obesity in future life.
- ✓ Colostrum contains some growth factors that stimulate the development of infant's immature intestines to digest and absorb milk and prevent the absorption of undigested proteins.

Advantages to the Mother

- ✓ It reduces the possibility of breast, uterine and ovarian, cancers.
- ✓ It protects the mother against osteoporosis and UTI s
- ✓ It helps the mother to loose additional fat that accumulates during pregnancy; thereby, helping her to restore the pre-pregnancy body shape , along with some post-pregnancy exercises.

It saves time, effort, and money when compared to formula feeding.

Effects of Infant Milk Substitutes and Bottle Feeding

→ **Bottle feeding** is an alternative method for breastfeeding, which is used by mothers who cannot breastfeed or want to give formula milk along with breast milk. Sometimes breast milk is also given through bottles.

Procedure

- Firstly, the (teat) and bottle should be cleansed, sterilised, and kept covered.
- Formula milk should be prepared as required, i.e., when the baby is hungry.
- The flow and temperature of milk should be checked by sprinkling some drops on inner side of wrist.
- The mother should sit comfortably and keep the baby on her lap with his/her head higher than the rest of the body.
- The teat should be put on the corner of baby's mouth and inserted when he/she opens mouth.
- The bottle should be kept at such an angle that the teat remains completely filled with milk, without any air
- The mother should make the baby/burp during and after the feeds.
- After burping, the mother should keep the baby in right lateral position.

Advantages

- ✓ Formula milk is given less frequently as it is difficult to digest.
- ✓ Exact quantity of milk consumed by the baby can be measured easily.
- ✓ Bottle feeding can be done by any family member, i.e., presence of mother is not necessary when the baby is being fed with a bottle.

Effects

- ✗ Lack of Antibodies:
- ✗ Less Bonding between Mother and Child
- ✗ Cleaning Issues:
- ✗ Expensive Method
- ✗ Difficult to Digest
- ✗ Less Nutritional:
- ✗ Unable to Maintain baby Weight
- ✗ More Stuff to Carry
- ✗ Choking
- ✗ Tooth Decay
- ✗ Ear Infections:

- ✖ Crying inconsolably
- ✖ Fever during or after a cold

Formula feeding puts the baby at risk

Examples

- ↩ Illness and Hospitalisation
 - I. Diarrhoea
 - II. Ear Infections
 - III. Lung Infections
 - IV. Other Infections
- ↩ Allergies and Asthma
- ↩ Lower IQ Score
- ↩ Chronic Diseases
 - i) Diabetes
 - ii) Obesity
 - ii) Heart Disease
 - iv) Childhood Cancer

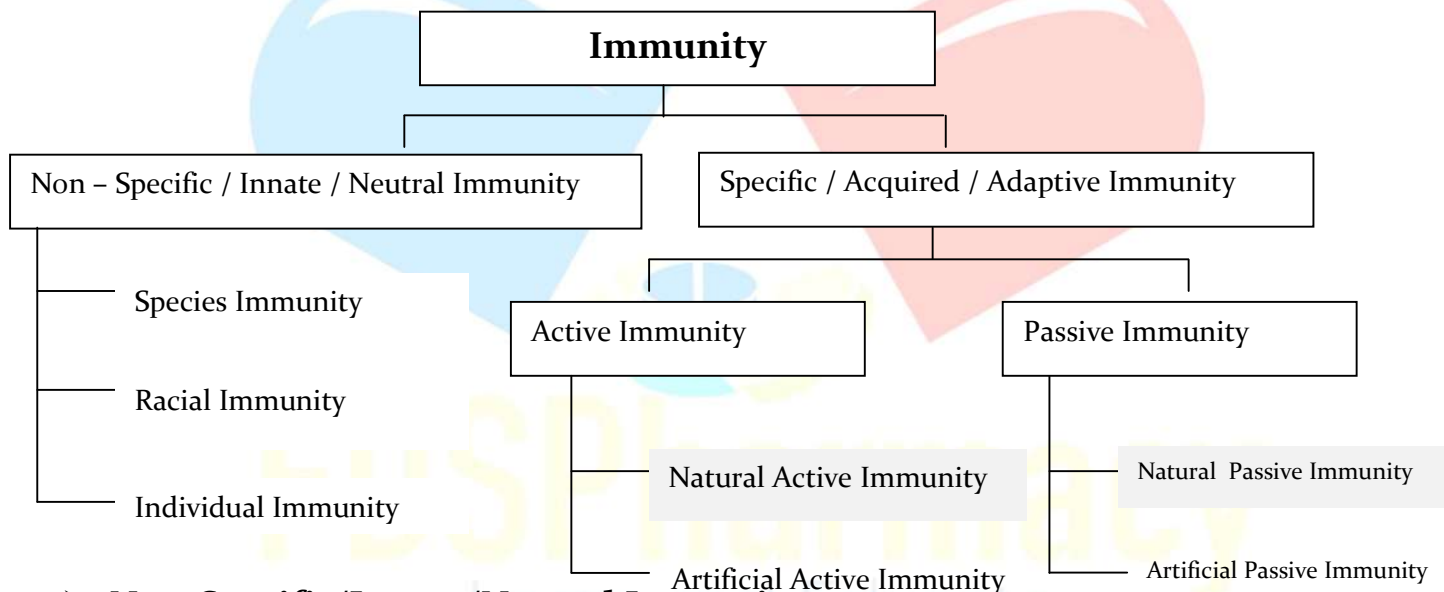


IMMUNITY

- The word immunity (*Latin* immunis meaning **exempt**) describes the protection against diseases.
- It indicates that an individual has developed lifelong resistance to a certain disease after being infected with it only once.

Types of Immunity

1. Non-specific/innate/neutral immunity,
2. Specific/acquired/adaptive immunity.



➤ Non-Specific/Innate/Neutral Immunity

- This type of immunity is present in an individual since birth, and is affected by the genetic and molecular structure of the genes and is independent of previous contact with foreign antigen molecules.
- It may be non-specific when there is resistance to infections in general or may be specific when resistance to a particular pathogen is involved.

➔ Species Immunity

- ☆ This type of immunity is found in all the members of a particular species, such as many microbes are pathogenic to humans but does not infect animals, e.g., B. Anthracis infects humans but not chickens.

➔ Individual Immunity

- ☆ An individual immunity when the body has been exposed to the diseases through either vaccination once exposed your immunity system generate antibodies. So tht the diseases can't affect you the second time

➤ **Specific/Acquired/Adaptive Immunity**

- This type of immunity is the set of responses which the immune system activates to target specific pathogens.
- It is also known as acquired immunity since the resistance is acquired by an individual during life.

➔ **Active Immunity**

- This type of immunity is the resistance acquired or developed by an individual after effective contact with an antigen. This contact may be in the form of either natural infection or by vaccination.

Active immunity is of two types:

Natural Active Immunity: Is the antibody protection your body creates against a germ once you are been infected with it.

For example, individuals recovering from chickenpox infection acquire natural active immunity against it

Artificial Active Immunity : It is protection produced by intentional exposure of a person to antigen in a vaccine

➔ **Passive Immunity**

- This type of immunity is introduced in an individual by preformed antibodies (usually in the form of antiserum) against infective agents or toxins
- Passive immunity is effective for a very short duration but it is important when immediate immune response is required
- e.g., anti-venom is used in cases of snake bites.

Passive immunity is of two types

Natural Passive Immunity: This is seen when antibodies are transferred from mother to the foetus (by placenta or milk) to protect it till its own immune system develops to function.

Artificial Passive Immunity: These chemicals or agents are introduced in the body through parenteral route.

IMMUNISATION

- According to WHO, immunisation has been defined as “a process in which a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine”.
- Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease
- It also develops an ability to produce an immediate response for a subsequent encounter because of immunological memory.
- The T cells, B cells, and the antibodies B cells are' the most important elements of the immune system these elements can be improved by immunisation.

- Memory B and T cells respond to a second attack by a foreign body)
- In passive immunisation, these elements are directly introduced into the body, instead of the production of these elements within the body.)

Immunological Products

→ Immunisation is a phenomenon in which immunity is provided using an immunising or biological or immunobiological agent.

The immunising agents may be of the following types:

- 1) Biologicals for active immunisation (e.g., vaccines and toxoids),
- 2) Biologicals for passive immunisation (e.g., antisera and 2) immunoglobulin).

Vaccines

The term vaccine has been derived from the Latin word **vacca** which means **cow**

- But according to the medical definition, vaccines are defined as “pharmaceutical suspension or solution of immunogenic substance compound that is intended to induce active immunity’.
- nowadays the vaccine term is applied to all the agents of active immunisation and the process is known as vaccination

Classification of vaccines

It is based on the type of preparation essentially involved in its manufacture.

◆ Inactivated-Killed Vaccines

These vaccines are prepared either by killing or inactivating the pathogens (by using heat or some chemical), and altering its antigenicity. Usually, they are first administered as a primary dose and then as booster dose(s)

◆ Live Attenuated Vaccines

Contain a version of the living virus that has been weakened so that it does not contain serious diseases in people with healthy immune system

Eg : Varicella(chicken pox)

Toxoids

- Toxoids are highly effective and safe immunising agents
- Tetanus toxoid and diphtheria toxoid are some common examples.)

Cellular Fractions

- Some vaccines are prepared from extracted cellular fractions. Examples of such vaccines are meningococcal vaccine
- prepared from the polysaccharide antigen of the cell wall

These vaccines have limited use, but are very effective and safe.

Combinations

- Mixed and combined vaccines have more than one kind of immunising agents.
- These vaccines are designed for easy administration, reducing the cost and the number of visits the patients should give to the health care centre of hospital.

Examples :

- 1) Measles, Mumps and Rubella Virus Vaccine live (MMR Vaccine).
- 2) Diphtheria and Tetanus Toxoids and Pertussis Vaccine Adsorbed (Tri-immunal).

Polyvalent Vaccines

- Polyvalent vaccines are prepared from two or more strains of the same species
- **Example :** pneumococcal vaccine, poly valent (pneumovax 23) and poliovirus vaccine.

Immunoglobulins

- Immunoglobulins also known as antibodies are glycoprotein molecules, which are produced by the plasma cells (WBCs).
- They act as a critical part of the immune response by They specifically recognising and binding to the particular antigens

Dose Schedule

Universal Immunisation Programme

- A programme of global immunisation known as Expanded Programme on Immunisation (EPI) was launched by the WHO.
- This program aims to provide protection to children all over the world against six diseases (diphtheria, whooping cough, tetanus, polio, tuberculosis and measles)
- which can be prevented by proper vaccination.
- In 1985, UNICEF adapted the EPI, which got further strengthened and in 1990 its name changed to Universal Child Immunisation.

The purpose of this program is to provide protection to the children all over the world against the six diseases by the year 2000.

Immunisation Schedules

National Immunisation Schedule

State of Immunization	Age	Immunising agent	No of doses
Infants	6 weeks to 9 months	DPT	3
	9 – 12 months	Polio	3
		BCG	1
		Measles	1
Children	16 – 24 months	DPT	1
		Polio	1
	5 – 6 Years	DT	1
		Typhoid	2
	10 years	TT	1
		Typhiod	1
	16 years	TT	1
Pregnant Women		Typhoid	1
	16 – 36 weeks of pregnancy	TT	1

Note:

- ← Two doses should be given with a gap of not less than one month.
- ← In case of institutional deliveries, BCG should be administered at the time of birth.

WHO EPI Immunisation Schedule:

- According to this schedule, the BCG and polio vaccines are either administered at the time of birth or when the infant first comes in contact with developing countries where these diseases are uncontrolled.

Age of Child	Immunising Agent
At birth	BCG and Oral Polio
6 weeks	DPT and Oral Polio
10 weeks	DPT and Oral Polio
14 weeks	DPT and Oral Polio
9 weeks	Measles



EFFECT OF ENVIRONMENT ON HEALTH

- According to WHO, Environmental health consists of human health, quality of life, determined by the environmental aspects such as physical, chemical, biological, social and psychosocial
- Environmental health may also be defined as the theory and actions of measuring, correcting, controlling and preventing those environmental factors that the health of current and future generations unfavourably.

Water Pollution

According to United States Public Health Services

“Water pollution means the presence of any toxic substance in water that degrades the quality to constitute a hazard or impair its usefulness”.

Causes of Water Pollution

- I. Domestic Sources
- II. Industrial Sources
- III. Mine Drainage Water
- IV. Rural and Agricultural Factors

Natural Impurities

- Dirt and Sediment or Turbidity:
- Total Dissolved Solids:
- Toxic Metals:
- Asbestos
- Radioactivity

Acquired Impurities

- ✂ Tastes and Odours
- ✂ Pesticides and Herbicides
- ✂ Toxic Organic Chemicals:
- ✂ Chlorine

Water-Borne Diseases

- ❖ Diarrhoeal Diseases
- ❖ Cholera
- ❖ Giardiasis
- ❖ Amoebiasis
- ❖ Bacillary Dysentery
- ❖ Typhoid and Paratyphoid
- ❖ Hepatitis A and E

Control Measures for Water Pollution

- i. **Industrial Effort :** A number of legislations have been formed that force the industries to make efforts towards cleaning the waste generated by them or developing an efficient system for waste disposal.
- ii. **Transportation :** Society can significantly reduce vehicular pollution by switching to hybrid and electric vehicles
- iii. **Farming Solutions :** In farming, switching to organic farming methods can significantly reduce the adverse impact of agricultural operations on the water bodies
- iv. **Waste Disposal :** Proper disposal of waste can significantly reduce the water pollution in the environment
- v. **Groundwater Contamination Controls :** Controlling the ground water from being polluted is one of the effective methods for reducing water pollution

Importance of Safe Drinking Water

- ✓ **For Saliva and Mucus Formation :** Saliva helps in digestion of food and retains the moisture of mouth, nose, and eyes to prevent friction and damage. Drinking water keeps the mouth clean, and can reduce tooth decay.
- ✓ **For Delivering Oxygen Throughout the Body :** Blood contains > 90% water, and carries oxygen to all body parts.
- ✓ **For Improving Skin Health :** Hydration boosts skin health and beauty. Skin can become more prone to skin disorders and premature wrinkling with dehydration.
- ✓ **For Regulating Body Temperature :** Water stored in the mid layers of skin rises to the skin's surface as sweat when the body warms up. It cools the body as it evaporates.
- ✓ **For Proper Digestion :** Water is needed for proper bowel movement. Digestive problems, constipation, and highly dehydration, of heartburn and stomach ulcers. Acidic stomach can result from thus increasing the risk of heartburn and stomach ulcers.
- ✓ **For Flushing Body Wastes :** Water is required for sweating and removal of urine and faeces.
- ✓ **For Maintaining Blood Pressure:** Dehydration can make the blood thicker, thus increasing blood pressure.
- ✓ **For Making Minerals and Nutrients Accessible:** These are dissolved in water to reach all body parts.
- ✓ **For Preventing Kidney Damage: Kidneys control body fluids :** Dehydration can result in kidney stones and other problems.
- ✓ **For Improving Performance during Exercise:** Drinking more water can enhance performance during strenuous activity.
- ✓ **For Weight Loss:** Water can help with weight loss if consumed in place of sweetened juices and sodas. Before meals “preloading” with water can prevent overeating by causing a sense of fullness

Air Pollution

→ According to World Health Organisation, "Air pollution is defined as, substances put into air by the activity of mankind into concentration sufficient to cause harmful effect to his health, vegetables, property or to interfere with the enjoyment of his property"

Air Pollutants

- ♦ **Carbon Monoxide (CO):** Carbon monoxide is a colourless, odourless, tasteless gas and is chemically inactive under normal temperature and pressure conditions. At normal concentration (0.1ppm), it has no side-effects, but at higher levels, it seriously impairs human metabolic activities.
- ♦ **Nitrogen Oxides NO_x :** NO_x consist of eight different oxides of nitrogen. Among them NO, NO_2 and N_2O are generally air pollutant.
NO is a colourless, odourless gas, whereas NO_2 is reddish brown gas with suffocating odour

Causes of Air Pollution

- ✖ Anthropogenic Causes (Human Activity): Such activities involve different kinds of fuel burning
- ✖ Stationary Sources
- ✖ Mobile Sources
- ✖ Chemicals, Dust and Controlled Burn Practices
- ✖ Fumes
- ✖ Dust from Natural Sources
- ✖ Methane
- ✖ Radon Gas
- ✖ Volcanic Activity

Effects of Air Pollution on Human Health

- ➔ Respiratory Problems
- ➔ Cardiovascular Problems
- ➔ Nervous System Problems
- ➔ Urinary Problems

Preventive Measures of Air Pollution

- ✓ Smart Driving Practice
- ✓ Select Air Friendly Product
- ✓ Prevent Indoor Pollution
- ✓ Support Clean Air Programmes
- ✓ Reduction at source by using Control Equipment

Noise Pollution

The unwanted sound dumped into the atmosphere leading to health hazards is known as noise pollution.

OR

It is also defined as “wrong sound, in the wrong place at the Wrong time”.

Sources of Noise Pollution

→ Transport Noise

- i. **Road Traffic Noise** : Noise emerging from road traffic such as road vehicles, high traffic speed, gear box, exhaust system, vibrations, etc.,.
- ii. **Rail Traffic Noise**: Noise emerging from rail traffic such as use of welded tracks, engines horns, coach suspensions, braking systems, etc.,
- iii. **Aircraft Noise** : This Include high noise produced by large and fast aircrafts while taking- off, during flight and while landing

→ **Industrial Noise** : Heavy Machineries and mechanisms used by different factories, mills and industries produce high amount of noise which causes noise pollution.

→ **Neighbourhood Noise**: Such noises include loud TV, radio sets, music, fireworks parties, playing of children, barking of dogs, etc

Effects of Noise Pollution

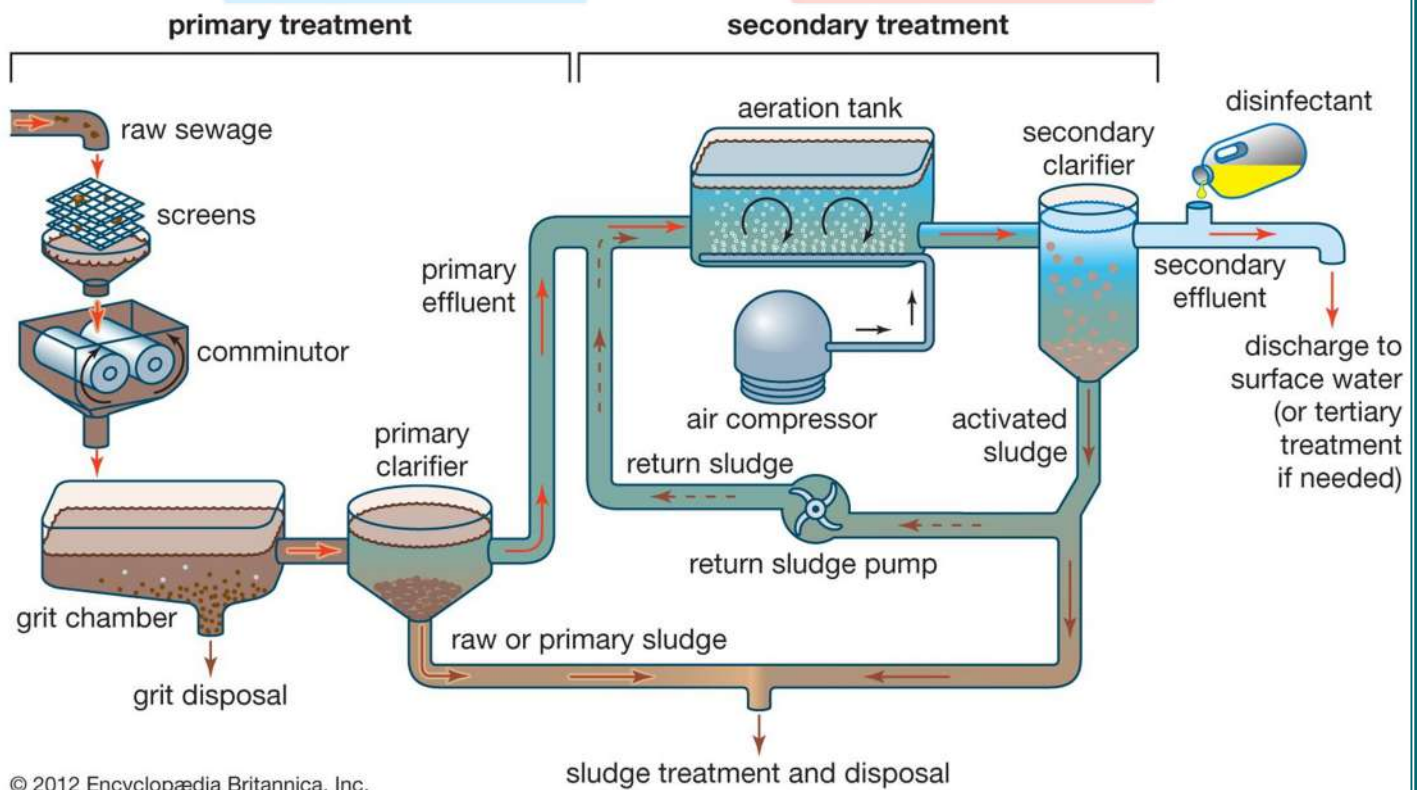
- ♦ **Deafness**: Hearing loss may be either temporary or permanent. Temporary hearing loss occurs when exposed to 4000-6000Hz and it disappears in a day; while permanent hearing loss occurs on repeated or continuous exposure to noise Around 100dB which generally damages the inner ear.
- ♦ **Non-Auditory Effects**: Increase in heart rate, blood pressure and intracranial pressure, sweating, nausea, giddiness, fatigue, and disturbed sleep are other temporary physiological changes caused by noise.

Control Measures of Noise Pollution

- ☑ **Control of Noise at Source**: This can be done by setting the noise producing machines at isolated areas, by applying mufflers and other Noise reducing equipment to machines.
- ☑ **Control of Noise Transmission**: This can be done by building enclosures and by covering the walls of the rooms with sound absorbing material.
- ☑ **Protection of Exposed Persons**: All the workers exposed on continuous noise louder than 85dB in the frequency bands above 150Hz require hearing protection.
- ☑ **Education**: The importance of noise as a health hazard should be educated to the public through mass communication media.

Sewage

- A type of wastewater produced by the community's people is known as sewage or domestic or municipal Wastewater
- Mostly blackwater (water for toilet flush, combining the human excreta that it flushes away); greywater from bathtubs, dishwashers, Sinks, clothes and showers; toilet paper (less amount in the areas where bidets are used); soaps and detergents are all contained in the sewage.
- The wastewater obtained from household kitchens, laundries, bathrooms, toilets and drains, or from industries and Businesses is considered to be Sewage
- Sewage contains only 0.4% solid waste particles and pollutants which are biodegradable and rest 99.6% (approx.) is water
- It is required by the larger industrial and commercial consumers to treat their sewage water or trade waste, before releasing it to the sewer, to significant quality standards and may need to incorporate pre-treatment machines, e.g.. grease traps



Sewage Treatment

1) Primary Treatment:

- ◆ It is the first stage in treating the sewage water.
- ◆ In this stage, quiescent basin is used to hold the sewage temporarily where lighter solids, oil, and Greece float while heavy waste can settle down to the bottom.

- ◆ The remaining liquid is released for the secondary treatment once the removal of settled and floating particles is done.
- ◆ Bypass facilities are also available after the primary treatment unit in some sewage treatment plants that are connected to a combined system of sewer.
- ◆ Thus, the secondary and tertiary systems can be safeguarded from the sewage and storm mixture that water only receives in primary treatment with the help of bypass.

2) Secondary Treatment:

- ◆ The suspended and dissolved biological particles are removed in the secondary treatment stage.
- ◆ Generally, indigenous micro-organism borne in water in an existing habitat performs the secondary treatment.
- ◆ Before releasing the secondary treated water for tertiary treatment, a process of separation is required to separate the micro-organism from the treated water.

3) Tertiary Treatment:

- ◆ In order to allow the release of treated water into a highly sensitive or fragile ecosystem such as low-flow rivers, estuaries, coral reefs and so on, tertiary treatment is anything more than primary and secondary treatments.
- ◆ Sometimes, before releasing the water into the streams, bay, lagoon
- ◆ Wetland or prior to using it for purposes like irrigation of greenway, park or golf course, lagoons or microfiltration are used to disinfect the treated water chemically or physically.
- ◆ It can also be used for the agricultural purposes or groundwater recharge, if the water is significantly clean.

Health Effects of Sewage

→ Several viruses, bacteria, parasites and fungi are contained in the sewage water resulting in infections in intestine, lungs, etc.)

- 1) **Bacterial Infections :** Diseases like campylobacter, diarrhea, headache, appetite loss, vomiting and fever is caused by the bacteria
- 2) **Fungi Infections:** Compost leads to grow fungi like Aspergillus and many others. It causes several health issues like running nose and, sometimes, may infect lungs causing serious problems like asthma
- 3) **Parasite Infections:** Parasites like Giardia lamblia and Cryptosporidium can cause a slight fever, stomach cramps, nausea and diarrhoea.
- 4) **Virus Infections :** Liver infection may be caused by the viruses like Hepatitis A

Waste Management

- ◆ The by-product of environmental, industrial and household The resources is considered as the waste. The procedure used for collecting, transporting, processing, recycling and monitoring
- ◆ The waste product is known as the waste management
- ◆ According to Tamworth Regional council waste management includes the, “practices and procedures or the administration of activities that provide for the collection, source separation, Storage , transportation, processing, treatment, and disposal of waste.

Waste Collection

- Collection of waste is the part of waste management process. Waste collection refers to the transfer of waste material to the landfill or treating point from the disposal and using point
- As part of a municipal landfill diversion programme, curbside collection of recyclable materials (technically not waste) is also included in the collection of waste)
- ◆ **Exchange Method:** Full containers are exchanged at their location with the empty containers in exchange method. For both high and low-density waste such. As sludge, construction debris, and waste from large hotels or institutions, exchange method is significant. The capacity of these containers is equal to 4m due to the economy.
- ◆ **One-Way Method:** Plastic or paper bags of volume 110L are used to collect waste in one-way method. There is no emptied container to be clean and return to the curb as bags are picking up by the hand.
- ◆ **Special Collection Systems :** The two types of special collection systems include hydraulic flushing and vacuum extraction. Both the system combines process of collection and transportation. However, these systems are less beneficial.
- ◆ **Non-Systematic Collection :** Bulky waste or big waste particles such as bulky goods are collected by non- systematic collection method.
- ◆ **Waste Transportation** The movement of waste over a particular area by tankers, barges, trains, trucks or other means of transport is known as waste transportation
- ◆ **Solid Waste Disposal** The process of collecting, processing, reusing or settling waste materials of humans is the disposal of waste

Chapter 3

NUTRITION AND HEALTH

Topics

Nutrition and health

BALANCED DIET

Nutrition Deficiency Diseases

Effects of Junk Foods

Nutritive and Calorific Values of Various Foods

Fortification of foods

INTRODUCTION TO FOOD SAFETY

ADULTERATION OF FOODS

ARTIFICIAL RIPENING OF FRUITS

PESTICIDES

GENETICALLY MODIFIED FOODS

DIETARY OR FOOD SUPPLEMENTS

NUTRACEUTICALS

NUTRITION AND HEALTH

- ◆ Nutrition includes all the processes or activities by which the human body intakes and utilises all the required food for its growth, development, regulation, and repair.
- ◆ Nutrition is a branch of life sciences which deals with the process of receiving and utilising all the substances required for growth and development as well as keeping the body healthy.
- ◆ It includes all the steps starting from the intake and swallowing of food, digestion of food as it passes through the GIT.,

Macronutrients and Micronutrients

- The supply of materials (in the form of food) required for supporting life in cells and organisms is termed Nutrition (or nourishment).
- A healthy diet prevents or improves a number of common health problems.
- ◆ The following seven major classes of nutrients are essential:

- I. Carbohydrates,*
- II. Vitamins,*
- III. Minerals,*
- IV. Water.*
- V. Proteins,*
- VI. Fats,*
- VII. Fibres,*

These nutrient classes are divided into:

- 1) **Macronutrients:** These nutrients provide calories or energy to the body and are needed in large quantity for maintaining its functions and carrying out the daily life activities. They include carbohydrates, fats, fibres, proteins, and water.
- 2) **Micronutrients:** They are needed in smaller quantities and include minerals and vitamins. But, their deficiency may result in severe or life threatening conditions.

They perform many functions, like enabling the body for producing enzymes, hormones, and other substances required for normal growth and development.

The three major functions of the essential nutrients:

Functions	Nutrients
Provide Energy	Carbohydrates, Proteins, Lipids (fats and oil)
Promote Growth and Development	Proteins, Lipids, Vitamins, Minerals, Water
Regulate Body Functions	Proteins, Lipids, Vitamins, Minerals, Water

➔ Carbohydrates

- ◆ Carbohydrates are the sources of energy, and contain carbon, hydrogen, and oxygen.
- ◆ They add large amount of calories (4kcal/gram) in the diets.
- ◆ The amount of calories an individual requires depends on the age, sex, size, health, and intensity of physical activity.

Carbohydrates are divided into:

Starch: Foods like bread, potatoes, rice, cereals, and pasta contain starch. These foods provide energy and do not have a high content of calories.

Sugar: Sugar is not an essential part of diet, as it only provides calories and no other nutrients. Sugar in excess amount can lead to tooth decay and weight gain.

Excess calories from the body can be removed (without the loss of any nutrients) by merely reducing the amount of sugar intake, i.e., by having low-calorie drinks, sugar-free tea and coffee, and by avoiding cakes and sweets.

➔ Proteins

- Proteins are required for body growth, repair, and healing.
- Around 20 different proteins contain carbon, hydrogen, oxygen, nitrogen, and sometimes sulphur molecules.
- Meats and poultry, fish, eggs, nuts, beans, and lentils are the rich sources of proteins.
- Protein molecules are made up of amino acids.
- A healthy diet should contain 9 essential amino acids in sufficient amount
Histidine, Leucine, Methionine (And/Or Cysteine), Phenylalanine (And/Or Tyrosine), Threonine, Isoleucine, Lysine, Tryptophan, Valine.,

➞ Fats

- Fats provide energy and contain fat-soluble vitamins.
- They insulate the body against cold.
- Essential fatty acids are required by human health.
- Human body can synthesise fat from carbohydrates.

Types of Fats

- Saturated Fat,
- Monounsaturated Fat,
- Polyunsaturated Fat,
- Trans Fat etc

➞ Vitamins

- Vitamins are organic substances that maintain the normal structure and function of cells.
- Since they cannot be synthesised by the human body, they should be added in the human diet from external sources.
- Vitamins mostly are obtained from plants or animals.

Vitamins are of the following two types:

- 1) **Fat-soluble Vitamins:** These include vitamin A, D, E, and K. They undergo intestinal absorption in the presence of bile salts and intact pancreatic function.
- 2) **Water-soluble Vitamins:** These include vitamin C and B complex group. They undergo rapid absorption from small intestines.

➞ Minerals

- Minerals are required for various body functions.
- Calcium, magnesium, sodium, potassium, and phosphorus are required in larger amounts; while iron, iodine, fluoride, zinc, and selenium are required in comparatively small amounts.
- Some essential minerals are discussed below:
 - 1) Calcium,
 - 2) Magnesium
 - 3) Sodium
 - 4) Potassium. Etc

➔ **Fibres**

- Fibres help in keeping bowels working regularly and the large intestine healthy.
- Breakfast cereals, wholemeal or granary bread, fruits and vegetables, wholegrain rice, pasta, potatoes (the skins especially), beans, pulses, and lentils are the sources of fibres.

Importance of Fibre in Diet

- ➔ It helps in intestinal peristalsis movement.
- ➔ The weight and size of stool increases and softens because of dietary fibre.
- ➔ High-fibre foods also reduce blood pressure and inflammation.
- ➔ In diabetic patients, soluble fibre slows the absorption of sugar that helps in improving blood sugar levels.
- ➔ Increase in dietary fibre intake (especially cereal fibre) reduces the risk of death that may occur due to cardiovascular disease and all cancers.

➔ **Water**

- Water forms the major component of body mass.
- A human body can survive only a few days without water; deficiency of any other nutrients does not show such profound effects.
- Lack of water increases blood pressure, malfunctions heart, and also results in failure of kidneys.

Importance of Water in Diet

- ❖ It helps in the transport of nutrients and waste products in and out of cells.
- ❖ It is required for all digestive, absorption, circulatory, and excretory functions.
- ❖ It is required for utilising the water-soluble vitamins.
- ❖ It is required for maintaining proper body temperature.
- ❖ It maintains the health, and integrity of every cell in the body.
- ❖ It keeps sufficient bloodstream liquid to flow blood vessels through.
- ❖ It transports nutrients and oxygen to cells.

BALANCED DIET

- A balanced diet contains different food items in such quantities and proportions that the requirement for healthy person
- Health Benefits of a Balanced Diet.
- It increases energy, improves the body functioning, boosts the immune system, and prevents weight gain.
- It prevents the risk of developing certain diseases (diabetes, cancer and heart disease).
- It reduces symptoms, and allows an individual to better manage his/her illness.
- It makes an individual energetic, manages his/her weight, and helps to fight stress.

Nutrition Deficiency Diseases

➔ Diseases Induced due to Deficiency of Proteins

The most prominent form of protein deficiency state is Protein Calorie Malnutrition (PCM), frequently affecting the infants and 1-3 years of children.

PCM is characterised by:

1. **Marasmus:** It is a chronic condition which results due to the deficiency of total energy intake. Thus. protein and energy reserves of the child get depleted
2. **Kwashiorkor:** It is a condition mainly affecting the individuals with adequate calorie intake but a relative protein deficiency, and who are catabolic with trauma, infection, or burns

➔ Diseases Induced due to Deficiency of Vitamins

Vitamin deficiencies in children. adolescent. pregnant and lactating women more commonly occur in developed countries. conditioned deficiencies can occur in either case.

Vitamins are categorised into:

- 1) Fat-soluble Vitamins: Vitamin A. D. E. and K.
- 2) Water-soluble Vitamins: Vitamin B complex and C.

Vitamins And Their Chemical name		Deficiency Diseases
Vit A	Retinol	Stunted growth, Night blindness, Dryness of eyes
Vit B ₁	Thiamine	Loss of muscle tone, beri beri

Vit B2	Riboflavin	Cheilosis, Eye lesions
Vit B3	Niacin or Nicotinic Acid	Diarrhoea,
Vit B5	Pantothenic	Dermatitis, Adrenal
Vit B6	Pyridoxine	Seborrheic
Vit B7	Biotin	Bacterial and fungal infections.
Vit B9	Folic Acid	Anaemia, Diarrhoea
Vit B12	Cyanocobalamin	Pernicious anaemia,
Vit C	Ascorbic Acid	Bleeding gums,
Vit D	Calciferol	Rickets in Childrens,
Vit E	Tocopherol	Neurological disorder
Vit K	Phylloquinone	Slow blood clotting,

➔ Diseases Induced due to Deficiency of Minerals

- Mineral deficiency is mainly caused when an individual does not receive sufficient essential minerals from food or supplements.
- Different types of diets result in mineral deficiency.
- A major cause is poor diet including junk food, and lacking fruits and vegetables.
- A very low calorie diet (especially in individuals undergoing weight-loss programs or with eating disorders) may also cause this deficiency.

Mineral deficiency is categorised into:

- ✂ Calcium Deficiency : Osteopenia
- ✂ Iron Deficiency : anaemia.
- ✂ Magnesium Deficiency : Fatigue, weakness, appetite loss, nausea, and vomiting are the early signs of magnesium deficiency.

Effects of Junk Foods

- Junk foods are food items with very small or no nutritional value (e.g, cold drinks, burgers, oily food, bakery products, candies, etc.)
- They are rich in fat, salt, and calories.
- Nutritional intake of the body reduces with increased consumption of junk foods; and this eventually leads to deficiency of essential nutrients, thereby causing health-related problems.

Types of Junk Foods

- 1) Refined Food:** Refined wheat flour, pasta, bread, oils and white sugar are examples of refined food. Intake of sugar in large amount increases unwanted body fat because sugar gets converted into fat.
- 2) Hydrogenated Fats and Oils:** Cookies, burgers, chips, fries cooked with trans and hydrogenated fats are unhealthy. Intake of large amount of fats results in strokes or heart disease because the fat starts depositing in the arteries. Omega-3 fatty acids are an alternative of such fats and oils.
- 3) salt :** Potassium present in the salt helps in balancing of body water. Though, excessive amount of sodium causes high blood pressure. Normally, large amount of salt is present in packed and canned food items.

Adverse Effects of Junk Food

- Respiratory Problems
- Affected Nervous System
- Dull and Lifeless Skin
- Weak Bones
- Heart Diseases
- Increased Blood Pressure
- Behavioural Issues
- Obesity
- Memory Loss
- Diabetes
- Kidney Diseases

Nutritive and Calorific Values of Various Foods

Based on its nutritive value, food is classified as follows:

- Cereals and millets
- Pulses and legumes
- Fruits
- Animal Food
- Nuts and oil seeds
- Green leafy vegetables
- Milk and milk products

➤ **Cereals and Millets**

Cereals include wheat, rice, and maize: while millets include Jowar, Bajra, Ragi. etc. (i.e., the coarse grains). About 100gm of cereals yield 350kcal of energy.

➤ **Pulses and Legumes**

Green gram, Bengal gram, red gram, lentils, and black gram are consumed in majority of Indian states. Pulses contain 20-25% of protein (more than that obtained from cereals, meat, and eggs).

➤ **Vegetables**

Vegetables (especially green leafy vegetables, roots, and tubers) are a chief source of vitamins and minerals, and also contain sufficient quantity of water. Except for peas, all vegetables contain small amounts of protein and energy.

➤ **Nuts and Oil Seeds**

Groundnut (peanut), cashew nut, coconut, almonds, pistachio, mustard seeds, sesame seeds, cotton seeds, sunflower seeds, maize germ, etc. are the nuts from which cooking oils are extracted. Nuts and oilseeds are good sources of fat, and also contain small amounts of good quality protein. Nuts are good sources of vitamin B and minerals (calcium, phosphorus, and iron.) Vegetable oils are mostly rich in essential fatty acids.

➤ **Fruits**

Fruits are protective food, which are rich in vitamins and are a good source of minerals. They contain cellulose that helps in peristalsis. The energy content of fruits is normally less; however, bananas, mangoes, grapes, etc., are rich source of energy. Ripe fruits contain more carbohydrates. Daily intake of 85-100gm of fruits is recommended.

➤ **Animal Food**

Meat includes flesh of cattle, pigs, sheep, etc. Meat protein contains sufficient quantities of essential amino acids. Meat also includes 15-20% of protein, 10-20% of fat, and large quantities of minerals and vitamin B.

➤ **Fats and Oils**

Fats and oils are good sources of energy and fat-soluble vitamins. They are used in cooking. Vegetable fats (groundnut oil, mustard oil, etc.) are superior to animal fats (butter, ghee, etc.). Coconut oil is used in Southern India; groundnut, mustard and Northern soya bean oils are used in India. Fats are also obtained from cashew nut, almond, chestnut, etc.

Fortification of foods

- ❖ Fortified foods are those in which nutrients that do not naturally occur in the food are added.
- ❖ These foods are intended for improving nutrition and enhancing the health.
- ❖ For example, milk is fortified with vitamin D, calcium may be added to fruit juices, etc,
- ❖ Fortification is the process of adding nutrients or non-nutrient bioactive components to edible products (e.g., food, food constituents, or supplements).

Types of Fortification

- Biofortification (breeding crops to increase their nutritional value, which includes plant breeding as well as genetic engineering),
- Microbial biofortification and synthetic biology (addition of probiotic bacteria),
- Commercial and industrial fortification (flour, rice, oils).
- Home fortification (e.g., vitamin D drops).

Benefits of Food Fortification

- ✂ It is an excellent method for improving the health of large population, since the nutrients can be added to staple foods being consumed widely.
- ✂ It is a safe method of improving nutrition among people. Adding micronutrients to food does not put any health risk to the people.
- ✂ It is possible to add one or more micronutrients without adding considerably to the total cost of the
- ✂ food product at the point of manufacture.

INTRODUCTION TO FOOD SAFETY

- Food safety involves the procedures followed at the time of preparation, handling and storage of the food to prevent food-borne illness and injury.)
- Any health hazards can be encountered by the food products during their transportation through supply chain.
- Proper and safe handling of food is essential to prevent food-borne diseases.
- Food poisoning can be avoided by

- Preparing and serving food safely.
- Preventing the transmission of bacteria through cross-contamination.
- Presenting the food in a hygienic way

Tips for Safe Food Handling

- Those working in a kitchen should have clean hands prevent the spread of microorganisms.
- Food workers should frequently wash their hands.
- Hands should be dried with a paper towel.
- Gloves should be used to protect damaged skin or protect hands from the risk of developing skin conditions.
- Food workers should maintain personal receiving, storing, cooking hygiene while processing, packing, transporting or distributing the food.

ADULTERATION OF FOODS

- Food adulteration is the practice of adulterating food or contaminating food materials by adding adulterants, which are poor quality substances added to food items for economic and technical benefits.
- These adulterants can be available in all food products consumed daily, including dairy products, cereals, pulses, grains, meat, vegetables, fruits, oils, beverages, etc.
- The process of contaminating food or adding adulterants to them is a Common practice in developing countries.
- For example, milk can be diluted by adding water to ease its quantity and starch powder is added to increase its solid content.

Food products are adulterated due to the following reasons:

- It is done as a part of the business strategy.
- It is done to increase the quantity of food production and sales.
- It is done due to make maximum profit from food items by fewer investments.
- It is done due to increased food demand for a rapidly growing population.
- It is done due to lack of knowledge on proper food consumption.

Prevention of Adulteration

- The National Health Service and Food Research Institute states that several food products have been adulterated to increase the quantity and make more profit.
- World Health Day is celebrated globally every year on 7th of April. As per reports, WHO aims to make everyone aware of the adulterations of food products, and motivate them to have a healthy balanced diet.

Adulteration can be prevented as follows:

- All the grains, pulses and other food products should be cleaned and stored.
- Fruits and vegetables should be thoroughly washed in running water before use.
- Before buying food products, like milk, oil, and other pouches, the seal should be checked for validity.

ARTIFICIAL RIPENING OF FRUITS

- ❖ Ripening is a natural physiological Process because of Which the fruit becomes sweeter, more palatable, edible, nutritious, softer, and attractive.
- ❖ Ripening is also related to colour change because of the pigments already present or produced during ripening.

Effects of Artificial Ripening

- It causes Symptoms like headache, dizziness, high sleepiness, memory loss etc
- Pregnant women particularly need to be very carefully and should not consume such fruits and vegetables.

PESTICIDES

The Food and Agriculture Organisation (FAO) defined pesticide as any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm or interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and Wood products, or animal feed stuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies.

Types of Pesticides

Based on the Types of Pests they Kill

- Insecticides – insects
- Herbicides - plants
- Rodenticides - rodents (rats and mice)
- Bactericides – bacteria
- Fungicides - fungi
- LarviCides - larvae

Uses of Pesticides

- ☉ The major advantage of pesticides is that they can save farmers by protecting the crops from insects and other pests.

Some other primary benefits of pesticides are:

- They control pests and plant disease vectors.
- They control human/livestock disease vectors and nuisance organisms.
- They control organisms that may harm other human activities and structures.

Effects of Pesticides

- ➔ The toxic chemicals present in pesticides are purposely released in the environment. Each pesticide is intended to kill a certain pest, still a large number of pesticides do not reach their target, and eventually enter the air, water, sediments, and even food.

GENETICALLY MODIFIED FOODS

- ➔ Genetically Modified (GM) foods are derived from Organisms whose genetic material (DNA) has been modified by using modern biotechnology, gene technology, recombinant DNA technology, and genetic engineering.
- ➔ Most existing genetically modified crops have been developed for improving yield as they prevent the crops from plant diseases or increase the tolerance of herbicides.

- ➔ Because of improved yields and reliability, GM foods play a vital role in the reduction of food prices.

Genetically Modified (GM) Foods

- Foods manufactured via Genetically Modified Organisms (GMOs) are termed as GM foods.)
- Positive Impacts of GM Crops.
- They are faster and low priced.
- They achieve the desired change in very few generations.
- They improve the agricultural yield with less labour and cost input.
- They provide benefits to the soil of "no-till" farming practice
- They decrease the usage of pesticides and herbicides.

Negative Impacts of GM Crops

- ➔ Environment
- ➔ Health

DIETARY OR FOOD SUPPLEMENTS

- The Dietary Supplement Health and Education Act of 1994 defined dietary supplements as **products intended to supplement the diet to enhance health.**
- These supplements include vitamins, minerals, amino acids, enzymes, herbs, and other botanicals.
- Dietary supplements are marketed as tablets, capsules, soft gels, gel caps, powders, and liquids.

Types

- ✂ **Natural:** These supplements are extracted from plants, animal tissues, or inorganic materials, like seawater and rocks.
- ✂ **Semi-synthetic:** These supplements are extracted from natural sources and then changed chemically,
- ✂ **Synthetic:** These supplements are produced by artificial methods.

Benefits

- To reduce the risk of evolving a chronic age-related disease (cancer, heart disease, osteoporosis, or type 2 diabetes).
- To improve the immune system.
- To cure or reduce the symptoms of a non-deficiency disease, like clinical depression or arthritis.
- To facilitate the intake during periods of increase in conditions of pregnancy, illness, or old age.)
- To facilitate athletic performance

NUTRACEUTICALS

- In 1989, Stephen Defelice discovered the term nutraceuticals from nutrition and pharmaceutical.
- He defined nutraceutical as a substance that is considered as a food or its part, which provides nutritional value and other health benefits, including disease prevention or health promotion.
- Thus, nutraceuticals are foods or food ingredients that provide medical or health benefits.

Classification

Depending upon various characteristics, nutraceuticals are classified into the following major classes:

- 1) Nutraceuticals according to their food source.
- 2) Nutraceuticals according to their mechanism of action.
- 3) Nutraceuticals according to their chemical nature.
- 4) Nutraceuticals according to their higher contents in specific foods items.

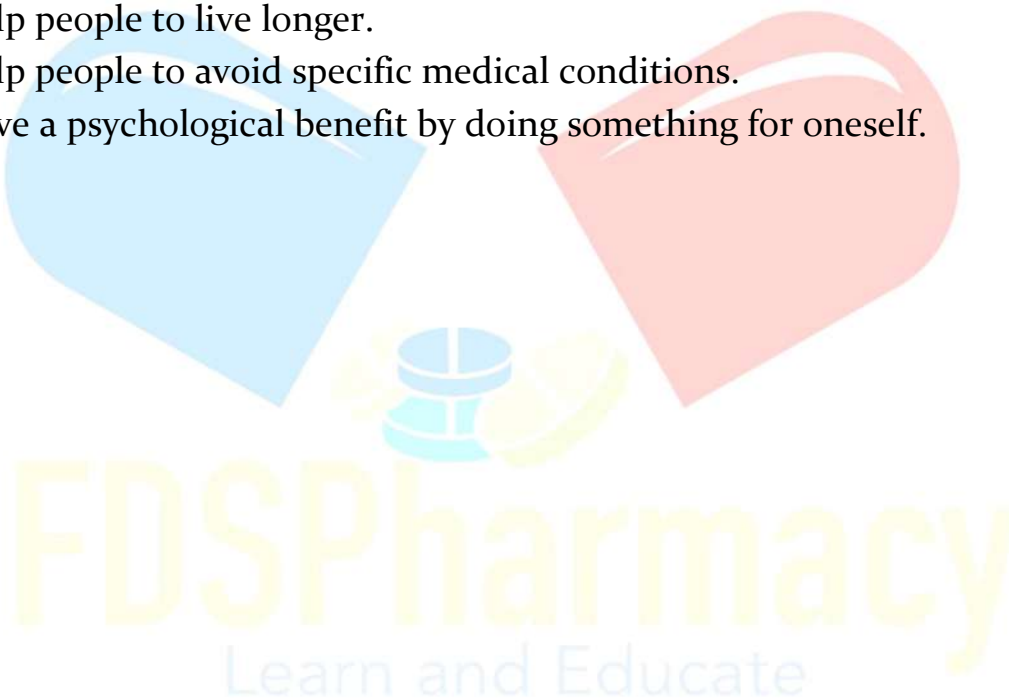
Nutraceuticals According to Food Source

Sources	Examples of Nutraceuticals
Plants	Ascorbic acid, quercetin, capsaicinoids, lycopene, B-carotene, catechins, curcumin, ellegic acid, anthocyanates, cellulose, c-tocopherol, and pectin.

Animals	Conjugated Linoleic Acid (CLA), EPA, DHA, choline, lecithine, ubiquinone, and sphingolipids.
Microbes	Yeast, Lactobacillus acidophilus, and Streptococcus salvaricus.

Benefits

- ✓ Nutraceuticals increase the health value of human diet.
- ✓ They help people to live longer.
- ✓ They help people to avoid specific medical conditions.
- ✓ They have a psychological benefit by doing something for oneself.



Chapter 4

Introduction to Microbiology and Common Microorganisms

Topics

Microbiology and Communicable diseases

Microorganisms

Epidemiology

Communicable diseases

Respiratory Infections

- Chickenpox
- Measles
- Rubella /German Measles
- Mumps
- Influenza
- Avian-Flu (Bird Flu)
- H1N1 (Swine Flu)
- SARS (Severe Acute Respiratory Syndrome)
- MERS (Middle East Respiratory syndrome)
- COVID-19
- Diphtheria
- Whooping Cough/Pertussis
- Acute Respiratory Infections (ARI)
- Tuberculosis
- Ebola Virus
- Meningococcal Meningitis

Intestinal Infections

- Poliomyelitis
- Viral Hepatitis
- Cholera
- Acute Diarrhoeal Disease
- Typhoid
- Amoebiasis
- Hookworm Infection
- Food Poisoning

ARTHROPOD-BORNE INFECTIONS

- ♦ Dengue
- ♦ Malaria
- ♦ Filariasis
- ♦ Chikungunya

Surface Infections

- ✚ Trachoma
- ✚ Tetanus
- ✚ Leprosy

Sexually Transmitted Diseases (STDS)

- Syphilis
- HIV / AIDSs

Introduction to Microbiology and Common Microorganisms

Microbiology and Communicable diseases

- The branch of life-sciences, involving the study of unicellular or cell-cluster microorganisms is termed as microbiology, and the specialist of this branch is known as microbiologist. Thus, microbiology is the specific area, concerned with the study of microbes that are too small and cannot be seen without magnification.
- The term microbiology was introduced by Louis Pasteur (a French chemist).

Scope of Microbiology

- I. Production of Antibiotics
- II. Production of Enzymes, Vaccines, Bio Surfactants, Alcoholic and Other Pharmaceutical Products
- III. Diagnosis of Diseases and Treatment
- IV. Identification of Microorganisms

Microorganisms

- Microbes or microorganisms are microscopic (mikros small + scopein -to see) independently living cells that form colonies.
- Microorganisms include a large and diverse group of microscopic organisms that exist as a single cell or clusters (e.g., bacteria, archaea, fungi, algae, protozoa, and helminths).
- Viruses are microscopic organisms but not cellular: while bacteria and archaea are classed as prokaryotes (pro-before+karyon-nucleus): the protozoa, and helminths are eukaryotes (eu - true or good+ karyon. They are extensively distributed in nature Some microbes are beneficial to life, but some are harmful.

Classification

- Bacteria,
- Virus,
- Algae,
- Fungi,
- Protozoa

Epidemiology

- ◆ This study of the distribution and determinants of health states or events in specified populations, and the application of to control health problems, is termed epidemiology.

Applications of Epidemiology

- i) To Study the History of Disease
- ii) Community Diagnosis
- iii) Look at Risks of Individuals as they Affect Groups or Populations
- iv) Assessment, Evaluation, and Research
- v) Completing the Clinical Picture
- vi) Determine the Causes and Sources of Disease

Introduction to Some Common Related Terms

1. **Enidemic** : It refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.
2. **Pandemic** : It is a disease outbreak that spreads across countries or continents. It affects more people and takes more lives than an epidemic.
3. **Endemic** : In epidemiology, an infection is said to be endemic in a population when that infection is constantly maintained at a baseline level in a geographic area without external inputs.
4. **Mode of Transmission** : It refers to how an infectious agent, also called a pathogen, can be transferred from one person, object, or animal, to another. Viruses, bacteria, parasites, or fungi can spread infectious diseases.
5. **Quarantine** : It refers to a state, period, or place of isolation in which people or animals that have arrived from elsewhere or been exposed to infectious or contagious disease are placed.
6. **Isolation** : It refers to separating sick people with a contagious disease from those who are not sick. Hospitals use isolation for patients who have a known infectious disease that can be spread easily to others.
7. **Incubation Period** : It is the time from infection to illness onset. Incubation period of a directly transmitted infectious disease is essential to determine the time period required for monitoring and restricting the movement of healthy individuals (i.e., the quarantine period).
8. **Contract Tracking** : It is the Process of Identifying, assessing, and managing people who have been exposed to a disease to prevent onward transmission.

Communicable diseases

- ◆ Communicable diseases are also known as infectious diseases.
- ◆ They spread from one person to another, i.e., a healthy person may catch it from an infected person.
- ◆ A disease is said to be communicable if it spreads from one person to another.
- ◆ Communicable diseases spread through air, water, food, and direct contact.
- ◆ Communicable diseases are transmissible from one person or animal, to another.
- ◆ The disease may be spread directly via another species (vector) or Via the environment.

Classification of Communicable Diseases

Based on the causative agent,

Communicable diseases are of the following types

- i) **Bacterial Diseases** : Diphtheria, tetanus, typhoid, tuberculosis, cholera, etc.
- ii) **Viral Diseases** : Mumps, measles, polio, small pox, chicken pox, rabies, etc.
- iii) **Protozoan Diseases** : Malaria, amoebiasis, kala-azar, sleeping sickness, etc.
- iv) **Helminth Diseases** : filariasis, trichinosis, liver rot, Taeniasis, ascariasis, etc.
- v) **Fungal Diseases** : Ring worm, athlete's foot, etc.
- vi) **Rickettsial Diseases** : Typhus fever, trench fever, Q-fever, Rocky Mountain spotted fever, etc.
- vii) **Spirochaetal Diseases** : Syphilis.

Based on the transmission mode

Communicable diseases are of the following types :

- **Contagious Diseases** : In these diseases, the healthy person gets infected by physical contact with an infected person.
- Examples of contagious diseases are measles, chicken pox, small STDs, leprosy, etc.
- **Non-Contagious Diseases** : In these diseases, healthy person gets infected on coming in contact with infected food, water, or air (and not by physical contact with an infected person)
- Examples of such diseases include cholera, tuberculosis, etc

Respiratory Infections

- Infections of the sinuses, throat, airways, or lungs are categorised under Respiratory Tract Infections (RTIs).
- These infections are mostly caused by viruses, and sometimes by bacteria.
- Common cold is the most widespread respiratory tract infection.

Infections of respiratory tract are categorised into two types:

1) Infections of Upper Respiratory Tract: These infections affect the nose, sinuses, and throat. For example,

1. Common cold,
2. Influenza (deadly viral infection),
3. Whooping cough,
4. Tonsillitis (inflammation of the tonsils and tissues at the back of the throat)

2) Infections of Lower Respiratory Tract: These infections affect the airways and lungs. For example,

1. Tuberculosis (bacterial infection of the lungs),
2. Influenza,
3. Bronchitis (inflammation of the lining of bronchial tubes),
4. Pneumonia (inflammation of the air sacs as they fill with fluid),

Chickenpox

- Chickenpox, also known as varicella, is a viral infection in which extremely itchy blisters develop on the entire body.
- Chickenpox is one of the definitive childhood infections, but after the development of chickenpox vaccine it has become less common.

Causative Agent

- The causative agent of chickenpox is V-Z or Varicella Zoster virus.

Epidemiology

- ◆ **Source of Infection :** The virus present in the nose and throat secretions, skin lesions, mucous membranes, and blood is the source of infection.
- ◆ **Period of Infectivity :** It is the duration of infection for a period of about one week, starting 1-2 days before the appearance of rash and 4-5 days thereafter.
- ◆ **Age :** Chickenpox mainly occurs in children below the age of 10 years; however, if there is no previous immunity no age is exempted and second attack of chickenpox may also occur.
- ◆ **Incubation Period :** It is the period of 14-16 days but it may be as wide as 10-21 days

Mode of Transmission

Chickenpox is spread by droplet infection and droplet nuclei. Most patients are infected by personal contact.

Clinical Presentations

- ◆ Runny or stuffy nose,
- ◆ light cough,
- ◆ Sometimes severe headache also starts,
- ◆ Feeling tired, and Vomiting.

Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should instruct the infected person to isolate for a week, as soon as the rashes appear.
- He/she should instruct the family to disinfect the articles contaminated by nasal and throat discharges.
- He/she should give Varicella zoster immunoglobulin vaccine within 72 hours of exposure for prevention.

Measles

→ Measles is an acute highly infectious viral disease, characterised by fever and small red spots on the entire body.

Causative Agent

- causative agent of measles is RNA paramyxovirus.

Epidemiology

- ♦ **Source of Infection** : When someone with measles coughs, sneezes or talks
- ♦ **Infection Period** : 4-5 days
- ♦ **Age** : 9 months – Adult age
- ♦ **Sex** : Both Male and Female
- ♦ **Incubation Period** : 10 – 14 days

Mode of Transmission

Secretions from nose, throat, and respiratory tract are the main sources of infection.

The virus gets transmitted either by droplet infection or droplet nuclei or both: thus it enters the human body via respiratory tract.

Clinical Presentations

- ♦ Rapid onset of high fever,
- ♦ Sneezing and nasal discharge,
- ♦ Photophobia,
- ♦ Reddened eyes.

Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should instruct the infected person to isolate for a week after the rashes appear.
- He/she should immunise the healthy person who is in contact with the infected person within 48 days of exposure.
- He/she should conduct immunisation promptly, when the epidemic has just begun.

Rubella /German Measles

→ Rubella (or German measles or three-day measles) is a contagious viral infection best known by its distinctive red rash.

Causative Agent

- German measles is caused by Rubella virus.

Epidemiology

- ♦ **Source of Infection** : Virus of paramyxovirus family causes measles and is passed via direct contact and through air.
- ♦ **Age and Sex** : 0 – 44 age mostly seen in female
- ♦ **Infective period** : 6 – 7 days
- ♦ **Incubation Period** : 12 – 23 days

Mode of Transmission

- ➡ Rubella virus is a highly contagious and can spread through close contact with the infected or through the air.
- ➡ It may pass from person-to-person through contact with nasal and throat droplets released on sneezing and coughing.

Clinical Presentations

- ✚ Mild fever of 102°F (38.9°C) or lower
- ✚ Headache
- ✚ Stuffy or runny nose
- ✚ Inflamed and red eyes

Role of Pharmacist in Educating the Public in Prevention

- Vaccination is a safe and effective way of preventing rubella.
- Pharmacists combine the rubella vaccine with vaccines for measles and mumps, and also for varicella.
- These vaccines are given to children between 12-15 months age.
- He/she should give a booster shot in children between 4-6 years age.
- Since the vaccines contain small doses of the virus, mild fevers and rashes may occur.

Mumps

→ Mumps is a viral infection that mainly occurs in salivary glands present near the ears. It can cause swelling or both of these salivary glands. Hearing loss, are potentially serious but rare complication of the mumps. There is not any specific treatment for mumps.

Causative Agent

- Mumps is a viral infection caused by the mumps Virus, belonging to the family of paramyxoviruses.
- These viruses are a common source of infection, especially in children.

Epidemiology

- ♦ **Source of Infection :** Patients suffering from mumps, Sub-clinical cases
- ♦ **Infective period :** 5-6 days
- ♦ **Age :** 5-9 year
- ♦ **Sex :** Both male & Female
- ♦ **Incubation Period :** 2 – 3 Weeks

Mode of Transmission

- ⇒ Mumps spreads through direct contact with saliva or respiratory droplets from the mouth, nose, or throat of the infected person.
- ⇒ Coughing, sneezing, or talking.
- ⇒ Sharing items that may have saliva on them, such as water bottles or cups.

Clinical Presentations

- ✚ Fever
- ✚ Muscle aches
- ✚ Headache
- ✚ Tiredness

Role of Pharmacist in Educating the Public in Prevention

- **Vaccination :** Currently, a highly effective live attenuated vaccine is available for the prevention of mumps. A single intramuscular dose of 0.5ml produces detectable antibodies in 95% of vaccines.
- **Immunoglobulin :** A specific immunoglobulin (IgM) is available; but its effectiveness has not been proved as antibody studies are still to be conducted on recipients.
- **Other Measure :** Pharmacist should ask the patient to immediately get isolated.

Influenza

- Influenza is an infectious disease caused by RNA virus belonging to Orthomyxoviridae family.
- It is generally referred to as flu.
- Influenza is characterised by fever, pain, and general weakness.

Causative Agent

The causative agent of influenza is influenza virus which is of the following three types:

- **Influenza A** : virus infects the birds, human beings, and other mammals,
- **Influenza B** : virus infects only human beings, and
- **Influenza C** : virus also infects only human beings.

Epidemiology

- ♦ **Source of Infection** : Cases, and Sub-clinical cases.
- ♦ **Infective Period** : 5-7 days
- ♦ **Age** : All ages
- ♦ **Sex** : In both male and Female
- ♦ **Incubation Period** : 18-72 hours.

Mode of Transmission

- The infection spreads either by droplet infection or droplet nuclei, via sneezing, coughing, or talking. Virus enters the human body via respiratory tract.

Clinical Presentations

- ✚ Fever,
- ✚ Headache,
- ✚ Soreness of throat
- ✚ Unproductive cough
- ✚ Congestion,
- ✚ Sneezing,

Role of Pharmacist in Educating the Public in Prevention

Pharmacist should recommend administration of vaccines and drug given below to prevent the transmission of influenza virus:

- 1) Killed vaccine,
- 2) Live attenuated vaccine,
- 3) Split virus vaccine, etc.

Avian-Flu (Bird Flu)

- The diseases that occurs due to infection with avian (bird) influenza (flu) Type-A viruses is termed as avian influenza.
- These viruses occur naturally among wild aquatic birds.
- Domestic poultry and other bird and animal species also get infected.
- Humans are not generally affected by avian flu viruses; but, sporadic human infections with avian flu viruses have resulted.

Causative Agent

- Bird flu is caused by a type of influenza virus that rarely infects humans.
- More than a dozen types of bird flu have been identified, involving the two strains, H5N1 and H7N9, which have recently infected humans.

Epidemiology

- ♦ **Source of Infection :** Bird flu occurs naturally in wild waterfowl and can spread into domestic poultry, like chickens, turkeys, ducks, and geese.
- ♦ **Infective Period :** 2 – 5 days
- ♦ **Incubation Period :** 2 – 17 days

Mode of Transmission

- Bird flu spreads by close contact with a dead or alive infected bird.
- Touching infected birds
- Touching droppings or bedding
- Killing or preparing infected poultry for cooking

Clinical Presentations

The following symptoms of bird flu appear very quickly:

- ✚ Extremely high temperature or feeling hot or shivery
- ✚ Muscle pain
- ✚ Headache
- ✚ Cough

Role of Pharmacist in Educating the Public in Prevention

- The FDA has approved a vaccine to protect against infection with one strain of the H5N1 avian flu virus. Although this vaccine is not yet available to the general public, the US government is stockpiling it and will distribute it if an outbreak occurs.
- This vaccine could be administered early in an outbreak to provide limited protection; while another vaccine for a specific type of the virus causing the outbreak, is developed and manufactured. Other forms of avian flu vaccines are also being developed by researchers.

H1N1 (Swine Flu)

→ Swine flu is a viral infection which infects the pigs. It is quite rare in people, but has not vanished. In 2009, a strain of swine flu, called H1N1, has infected many people worldwide.

Causative Agent

- Swine influenza is caused by influenza A viruses of Orthomyxoviridae family.
- Influenza A viruses are further characterised by sub-type by two major surface of glycoproteins, i.e., haemagglutinin and neuraminidase.

Epidemiology

- ♦ **Source of Infection :** Influenza viruses (H1N1) infect the cells lining the nose, throat and lungs in human body. The virus enters the body through inhalation of contaminated droplets or when the live virus is transferred to eyes, nose, or mouth from a contaminated surface
- ♦ **Infective Period :** 5 – 6 days
- ♦ **Incubation Period :** 1 to 4 days

Mode of Transmission

- Swine flu viruses spread through pigs, generally due to close Contact or may be from contaminated objects between infected and uninfected pigs.

Clinical Presentations

- ✚ Body aches
- ✚ Cough
- ✚ Sore throat
- ✚ Tiredness
- ✚ Chills
- ✚ Headache
- ✚ Fever
- ✚ Vomiting and diarrhoea

Role of Pharmacist in Educating the Public in Prevention

- People should cover their nose and mouth with a tissue while coughing or sneezing, and should throw the tissue in trash after using it.
- People should wash their hands with soap and water, especially after coughing or sneezing. They should also use alcohol-based hand sanitizers.
- People should avoid touching their eyes, nose, or mouth to avoid spread of germs.
- People should avoid close contact with sick people.
- In case a person becomes sick, he/she should avoid going to work or school, should stay at home, and limit contact with others to protect them from getting and infected.

SARS (Severe Acute Respiratory Syndrome)

→ SARS is an example of communicable disease caused by a virus. SARS virus is a new strain of coronavirus, its genetic structure considerably differs from the known corona Virus. A patient of SARS may experience symptoms like fever, malaise, chills, headache, dizziness, nose.

Causative

- SARS is a communicable viral infection caused by virus belonging to the corona virus family of viruses (the same family of virus that causes common cold).

Epidemiology

- ♦ **Source of Infection :** SARS virus gets transmitted through respiratory droplets produced when an infected person coughs or sneezes.
- ♦ **Infective Period :** 5-7 days
- ♦ **Age :** All age
- ♦ **Sex :** In both male and Female
- ♦ **Incubation Period :** 10-14 days

Mode of Transmission

- The infection spreads either by droplet infection or droplet nuclei, via sneezing, coughing, or talking. Virus enters the human body via respiratory tract.

Clinical Presentations

The initial symptoms of SARS include:

- ✚ Cough,
- ✚ Difficulty in breathing,
- ✚ Fever greater than 100.4°F (38.0°C), and 3-4) Other breathing symptoms.
- ✚ Chills and shaking,
- ✚ Cough usually starting 2-3 days after other symptoms,

Role of Pharmacist in Educating the Public in Prevention

- To identify the infected persons as early as possible, along with their movements and contacts.
- To guide the SARS patients to isolate in community and hospitals.
- To provide protection of medical staff treating these patients.
- To identify and isolate the persons suspected to be infected.
- To follow the basic hygienic practices, like washing hands after touching the patients, using appropriate and well-fitted masks, and following infection Control measures.
- To provide timely and accurate report and to share other information with authorities and/or governments.

MERS (Middle East Respiratory syndrome)

→ MERS is a disease that affects the respiratory system, is caused by corona virus. Mild to moderate symptoms appear due to these viruses; however in certain cases, severe symptoms appear that may even cause death,

Causative Agent

- The causative agent of MERS is a strain of corona virus, known as MERS-CoV.

Epidemiology

- ♦ **Source of Infection** : MERS-CoV is a zoonotic virus that transmits from animals to humans.
- ♦ **Infective Period** : 2-5 days
- ♦ **Age** : 30-59 years age
- ♦ **Sex** : Both male and female
- ♦ **Incubation Period** : 2-14 days

Mode of Transmission

- ⇒ MERS-CoV spread from an infected persons respiratory secretions (through coughing)

Clinical Presentations

- ✚ Fever
- ✚ Coughing
- ✚ Runny nose
- ✚ Muscle ache
- ✚ Chills
- ✚ Sore throat
- ✚ Trouble breathing

Role of Pharmacist in educating the public in prevention

- Hands should be washed with soap and water, or alcohol-based hand sanitizer should be used.
- Proper respiratory hygiene measures (covering mouth and nose while coughing or sneezing) should be followed.
- Nose, eyes, or mouth should not be touched without washing hands.
- Surfaces and objects should be cleaned and disinfected.
- Close personal contact with sick people should be avoided.

COVID-19

- Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus, now called Severe Acute Respiratory Syndrome Coronavirus 2 (S.A.R.S-CoV.2) formerly called 2019-nCoV).
- It was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China.

Causative Agent

- The causative agent of COVID-19 is the highly contagious Severe Acute Respiratory Syndrome Coronavirus 2 (S.A.R.S-CoV-2).
- It is assumed that a beta coronavirus have originated in bats, and spread in humans by direct contact with respiratory droplets.

Epidemiology

- ♦ **Source of Infection :** COVID-19 virus spreads via droplets of saliva or discharge from nose when an infected person coughs or sneezes.
- ♦ **Infective Period :** Not more than 10 days after symptoms start appearing.
- ♦ **Incubation Period :** The estimated incubation period is 1-14 days and the symptoms usually appear in about 4 to 5 days.
- ♦ **Age :** Older people and those with underlying medical problems (cardiovascular disease, diabetes, chronic respiratory disease, and cancer) are at more risk of developing this serious illness.

Mode of Transmission

- The COVID-19 virus spreads by direct contact with respiratory droplets of an infected person (generated through coughing and sneezing).
- Person can also become infected by touching contaminated surfaces and the touching face (e.g-, eyes, nose, and mouth).

Clinical Presentation

- ✚ Fever
- ✚ Dry cough
- ✚ Tiredness
- ✚ Aches and pains
- ✚ Sore throat
- ✚ Diarrhoea
- ✚ Conjunctivitis

Role of Pharmacist in Educating the Public in Prevention

- Wear a Mask
- Stay 6 feet Away from other
- Get vaccinated
- Avoid crowds and Poorly Ventilated Spaces
- Wash Hands Often
- Cover Coughs Sneezes

Diphtheria

- Diphtheria is a disease of upper respiratory tract, and is characterised by Sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose
- It was a common diseases of children, but after the development of vaccines it has become less common in developed countries.

Causative Agent

- The causative agent of diphtheria is *Corynebacterium diphtheriae*.
- It is a gram-positive rod-shaped bacterium which affects the school-going children.

Epidemiology

- ◆ **Source of Infection :** The source of infection may be a patient or carrier. Most carriers are 5-8 years old.
- ◆ **Infective Material :** Nose and throat secretions contain the Diphtheria bacilli.
- ◆ **Infective Period :** 14-28 days
- ◆ **Age :** 1-5 years old. and Newborns
- ◆ **Incubation Period :** 2-5 days.

Mode of Transmission

- ☞ It is also transmitted via fomites. The bacteria enter through respiratory tract.

Clinical Presentations

- ✚ Fever accompanied with fatigue, and
- ✚ Characteristic grey or yellow coloured patches appear on the membrane of the upper respiratory tract (such as tonsils, larynx, and pharynx).

Role of Pharmacist in Educating the Public in Prevention

- Diphtheria can be prevented by immunisation with DPT vaccine, which should be given to a child on reaching the age of 6, 10, and 14 months.
- At the age of 18 months, a booster dose is given, and DT vaccine is given at the age of 5 years.
- Pharmacist should guide the patient to isolate either be at home or at hospital.
- He/she should guide the infected child to be excluded from school for at least 15 days.

Whooping Cough/Pertussis

→ Whooping cough is a highly infectious bacterial disease, characterised by uncontrollable and violent coughing. It mainly affects children,

Causative Agent

- The causative agent of whooping cough is a gram negative pleomorphic bacillus, *Bordetella pertussis*

Epidemiology

- ♦ **Source of Infection :** The source of infection is nose and throat secretions.
- ♦ **Infective Period :** 2 – 3 Weeks
- ♦ **Age :** mostly <5 years of age. However, the disease may affect all ages if there is no previous immunity.
- ♦ **Incubation Period :** 7-14 days.

Mode of Transmission

- The infected person is the major source of this disease which spread through droplet infection and fomites.
- The disease may also spread indirectly by touching articles contaminated with the discharge of infected person.

Clinical Presentations

- ✚ Mild fever,
- ✚ Irritating cough

Role of Pharmacist in Educating the Public in Prevention

- Early diagnosis through bacteriological examination of nose and throat secretions
- Isolating contacts and cases,
- Treating with erythromycin,
- Active immunisation with pertussis vaccine or DPT vaccine, and
- Passive immunisation with hyper-immune-gamma globulin.

Acute Respiratory Infections (ARI)

→ Acute Respiratory Infections (ARI) may cause inflammation in any part of the respiratory tract, starting from nose to alveoli. It also results in a wide range of signs and symptoms, ARI is classified into Acute Upper Respiratory Infection (AURI) or Acute Lower Respiratory Infection (ALRI) clinical syndromes,

Causative Agent

- Viral pathogens are the most common cause of respiratory infection in travelers. Causative agents include rhinoviruses, respiratory syncytial virus, influenza virus, parainfluenza virus, human metapneumovirus, measles, mumps, adenovirus, and corona viruses. Adenoviruses are a class of microorganisms that can cause acute respiratory infection. Adenoviruses comprises of more than 50 different types of viruses that lead to common cold, bronchitis, and pneumonia.

Epidemiology

- ♦ **Source of Infection :** Airborne route,
- ♦ **Infective Period :** 3-4 Days
- ♦ **Sex :** Females are more likely to get affected with upper respiratory tract infections, specifically sinusitis, tonsillitis, and otitis externa.
- ♦ **Incubation Period :** 2 to 14 days.

Mode of Transmission

- All the causative organisms of acute respiratory infections are transmitted through airborne route. Most of the causative viruses do not survive for extended time period outside the respiratory tract, and the chain of transmission is maintained by direct person-to-person contact.

Clinical Presentations

- ✚ Running Nose,
- ✚ Cough,
- ✚ Sore throat,
- ✚ Difficulty in breathing,
- ✚ Fever,
- ✚ And Ear problem,

Role of Pharmacist in Educating the Public in Prevention

- Understanding the risk factors of respiratory tract infections in childhood indicates several approaches for primary prevention.
- In developing countries, improved living conditions, better nutrition, reduced indoor smoke pollution, and better maternal and child

Tuberculosis

→ Tuberculosis (TB) is a highly infectious disease, characterised by inflammation in the lungs and other body parts, as the bacteria can attack lungs (most the commonly) and sometimes other body parts. The disease gets transmitted when a healthy individual inhales the Secretions (on coughing, sneezing, and talking) of an individual with tuberculosis of lungs.

Causative Agent

- The causative agent of tuberculosis is *Mycobacterium tuberculosis*.

Epidemiology

- ◆ **Source of Infection** : Person to person, Object to person,
- ◆ **Infective Period** : 4-5 Days.
- ◆ **Age** : 15-54 years old.
- ◆ **Sex** : Tuberculosis is more prevalent in males than in females.
- ◆ **Incubation period** : few months to 2 years

Mode of Transmission

- ☞ The sputum spitted out from TB infected person, acts as the major source of infection. It is an air-borne diseases transmitted via droplet infection or droplet nuclei, or both

Clinical Presentations

- ✚ Long episodes of coughing.
- ✚ Fever in the evening,
- ✚ Weight loss, and
- ✚ Anorexia.

Role of Pharmacist in Educating the Public in Prevention

- Survey and case-finding programmes should be conducted for cases from the general population.
- Selected groups and contacts of the patients are suspected cases, and should be examined and diagnosed periodically.
- People should be educated regarding the risks of tuberculosis and the preventive and control measures need to be taken.

Ebola Virus

- Ebola is a rare but a deadly viral infection. Its common symptoms are fever, body aches, diarrhoea, and bleeding inside and outside the body (in cases of severe infection).
- Ebola virus damages the immune system and organs, thus spreads through the body and ultimately reduces the levels of blood-clotting cells; this in turn leads to severe and uncontrollable bleeding.

Causative Agent

Ebola Virus Disease (EVD) is an infection caused by a group of viruses within the Ebola virus genus:

- Ebola virus (Zaire ebolavirus species).
- Sudan virus (Sudan ebolavirus species).

Epidemiology

- ♦ **Source of Infection :** Infected animals can transmit the virus to other animals (apes, monkeys, duikers. and humans).
- ♦ **Infective Period :** 3-5 Days
- ♦ **Age :** 2 – 35 years of age.
- ♦ **Sex :** In Both Male and Female
- ♦ **Incubation Period :** 2 – 21 days

Mode of Transmission

Ebola virus gets transmitted by direct contact through broken skin or mucous membranes of the eyes, nose, or mouth with:

- ☞ The blood or body fluids (e.g., urine, saliva, sweat, faeces, vomit, breast milk, and semen) of an infected person or a person who died from EVD.
- ☞ The objects (e.g., clothes bedding, needles, and medical equipment) contaminated with body fluids of Le infected person or the person who died from EVD.
- ☞ The infected fruit bats or non-human primates (e.g.. apes and monkeys)

Clinical Presentations

- ✚ Fatigue,
- ✚ Muscle pain,
- ✚ Fever,
- ✚ Headache,
- ✚ Sore throat,
- ✚ Vomiting,
- ✚ Diarrhoea,
- ✚ Rashes,

Role of Pharmacist in Educating the Public in Prevention

- To Reduce the Risk of Wildlife -to-Human Transmission:
- To Reduce , the Risk of Human-to-Human Transmission
- Outbreak Containment Measures

Meningococcal Meningitis

- Meningococcal meningitis is a bacterial form of meningitis. It is a serious infection of the thin lining surrounding the brain and spinal cord.
- Meningococcal meningitis is related to high fatality (50% when untreated) and high frequency (10-20%) of severe long-term sequelae

Causative Agent

- Meningococcal disease is caused by *Neisseria meningitidis*

Epidemiology

- ◆ **Source of Infection :** Inhalation of respiratory or throat secretions (saliva or spit) spread meningococcal bacteria.
- ◆ **Infective Period :** 7 – 14 days
- ◆ **Age :** 1 year age and Adolescence 16 – 23 Years age
- ◆ **Sex :** Both male and Female
- ◆ **Incubation Period :** 6 – 10 days

Clinical Presentations

- General poor feeling
- Sudden high fever
- Severe, persistent headache
- Neck stiffness
- Nausea or vomiting

Role of Pharmacist in Educating Prevention

- A pharmacist is an integral part of a patient's healthcare team.
- Bacterial Meningitis can be treated with a variety of antibiotics, but there is currently no specific treatment for viral meningitis; and most people recover on their own.

Intestinal Infections

- Infections of the gastrointestinal tract and mainly characterised by diarrhoea are categorised under by intestinal infections. It transmits through the contaminated food, water, or faecal matter. Diarrhoea, abdominal pain, cramps, nausea, and vomiting are the most common symptoms of an intestinal infection.
- These infections are caused by viruses, bacteria, parasites, Or other organisms.
- Examples of some common intestinal infections are:

❖ **Bacterial Infection** : These infections are caused on consuming food contaminated with the pathogenic Bacterial infections mostly occur if the food is not properly cooked or has been handled under unhygienic conditions.

Examples of some common bacterial intestinal infections are:

- i) Cholera caused by *Vibrio cholerae*,
- ii) Typhoid caused by *Salmonella enteritis*,
- iii) Parathyroid infections,
- iv) *E. coli* infections,

❖ **Viral Infections** : Stomach infections are also caused by viruses. These infections spread very rapidly. Intestinal infection caused by the rota virus is a major cause of death of children below 5 years of age.

Examples of some common viral intestinal infections are:

- i) Rotavirus infections,
- ii) Norovirus infections,
- iii) Adenovirus infections, and Astrovirus infections.

❖ **Parasites and Protozoans** : Many intestinal infections are caused by parasites and protozoas. These pathogens are not self-limiting and are killed by various medications.

Examples of some common parasitic and protozoal intestinal infections are:

- i) Amoebiasis caused by *Entamoeba hystolytica*,
- ii) Balantidiasis,
- iii) Giardiasis caused by *Giardia lamblia*,
- iv) Intestinal trichomoniasis.

Poliomyelitis

→ Poliomyelitis, also called polio is an infectious and acute disease affecting the central nervous system, which may lead to either temporary or permanent paralysis

Causative Agent

- The causative agent of poliomyelitis is polio virus Which is of three types namely type I, type II, type III.

Epidemiology

- ◆ **Sources of Infection** : Faeces: The virus is found for a few weeks in the faeces of adults and for 3 months in the faeces of young children.
- ◆ **Infective Period** : 7 – 10 days
- ◆ **Age** : Polio mostly Occurs between 1-2 years of age.
- ◆ **Sex** : In both male and female
- ◆ **Incubation Period** : 7-21 days.

Mode of Transmission

- **Faecal-Oral Route** : This is the most common route of transmission in which the virus transmits via contaminated water, food or flies
- **Droplet Infection** : The virus may also spread via infected individuals nasopharynx droplets. Close personal contact with infected individual facilitates droplet transmission.
- Direct infection is caused by finger contamination, whereas water, food, flies, etc., are the reasons of indirect infection.

Clinical Presentations

- ✚ In initial phase, polio fever, soreness in throat, and stiffness in neck are observed.
- ✚ There are cases in which polio causes foot drop and flaccid paralysis of the limbs.

Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should guide the infected person to isolate.
- He/she should guide the infected person to dispose- off urine as well as faeces properly.
- He/she should guide people to protect water source and supply of drinking water from contamination.
- He/she should guide people to avoid overcrowding at Schools as well as public places.
- He/she should guide people to take measures to restrict flies.

Viral Hepatitis

→ Hepatitis denotes liver injury in which inflammatory cells are found to be present in the liver tissues. This condition may be self-limiting, healing on its own, or can lead to liver scarring. The disease may be acute if it persists for less than 6 months or chronic if it continues for a longer time period.

Epidemiology

- ◆ **Source of Infection** : The virus spreads largely when an uninfected (and unvaccinated) person consumes food or water contaminated with an infected person's faeces.
- ◆ **Infective Period** : 6 – 12 days
- ◆ **Age** : mostly seen in 21 – 40 years age
- ◆ **Sex** : In both genders,
- ◆ **Incubation Period** : Approximately 28 days.

Mode of Transmission

- ➡ Faecal-Oral Route
- ➡ Direct Contact
- ➡ Blood

Role of Pharmacist in Educating the Public in Prevention

Hepatitis can be prevented by the following measures:

- Early diagnosis of infected individuals.
- Preventing the transmission of virus.
- providing protection to the susceptible population.
- Maintaining good personal hygiene to prevent the transmission of HAV via faecal-oral route.
- Practicing proper food handling,

Cholera

→ Cholera is an acute intestinal infection. In severe conditions, it becomes rapidly fatal. Within an hour of the onset of symptoms in a healthy individual, the blood pressure drops down to hypotensive levels, and the individual may die if not treated medically within three hours.

Causative Agent

- The causative agent of cholera is a gram-negative bacterium, *Vibrio cholerae*, which produces an enterotoxin (cholera toxin). This enterotoxin acts on the mucosal epithelium lining of the small intestine, and causes exhaustive diarrhoea (the most salient feature of this disease).

Epidemiology

- ◆ **Source of Infection** : Either a case or carrier is the major source of infection.
- ◆ **Infective Period** : 1 – 5 days
- ◆ **Age** : cholera may affect individuals of all ages.
- ◆ **Incubation Period** : Few hours to 5 days.

Mode of Transmission

- The most common contamination source is the faeces of an infected person, which contaminates the water and food.
- The disease spreads rapidly in areas where proper treatment of sewage and drinking water is not carried out.

Clinical Presentations

- ✚ Abdominal and leg cramps,
- ✚ Dehydration,
- ✚ Dry mouth and skin,
- ✚ Excessive thirst, Low urine output,
- ✚ Reduced blood pressure,
- ✚ Nausea,

Role of Pharmacist in Educating the Public in Prevention

- People should keep their house and surroundings clean and free from flies.
- People should be educated about the dangers created by fingers, food, flies, fomites, and faeces.
- Breeding of flies should be prevented. Quick and efficient removal of night soil and refuse should be arranged.

Acute Diarrhoeal Disease

→ Acute diarrhoeal disease can affect people of any age, but Children are more likely to be impacted. Acute diarrhoeal illnesses are characterised by the sudden onset of frequent loose or watery stools, accompanied by Vomiting and fever. The sickness is usually minor and recovers on its own.

Causative Agent

- The common infective causative bacteria are Salmonella and Vibrio parahaemolyticus, and causative viruses are norovirus, rotavirus, sapovirus, and astrovirus. Acute diarrhoeal diseases may occur in all ages; however, children are more commonly affected.

Epidemiology

- ◆ **Source of Infection :** Diarrhoea is a symptom of infections caused via host of bacterial, viral and parasitic organisms, most of which can spread by faeces-contaminated water.
- ◆ **Infective Period :** 1 to 3 days for viral diarrhoea.
- ◆ **Age :** In any age
- ◆ **Sex :** In both male & female
- ◆ **Incubation Period :** It usually ranges from a few hours to 5 days

Mode of Transmission

- ➞ Acute diarrhoeal infections are generally transmitted by contaminated hands or ingestion of Contaminated food or beverages. They can also spread through aerosol disperse by contaminated vomitus droplets.

Clinical Presentations

- ✚ Acute diarrhoeal illnesses are characterised by abrupt onset of frequent loose or watery stools, frequently accompanied by vomiting and fever. The sickness is usually minor and recovers on its own. In severe cases, dehydration and shock may occur.

Role of Pharmacist in Educating the Public in Prevention

- Maintain Good personal Hygiene
- Maintain Good food Hygiene
- Maintain Good Environment Hygiene

Typhoid

→ Typhoid, also known as typhoid fever is caused by ingesting the food or water contaminated with faeces from an infected person. The causative agent is a gram-negative short bacillus that is motile due to the presence of peritrichous flagella. The bacterium grows best at human body temperature (37°C/99°F.).

Causative Agent

- The causative agent is a gram-negative short bacillus, *Salmonella typhimurium* (S. typhi). Other than this, some Non-Typhoid *Salmonella* (NTS, Paratyphoid strains A, B, and C) may also cause this infection.

Epidemiology

- ♦ **Source of Infection :** Patients or carriers of typhoid fever are the major sources. Contaminated water, food, fingers and flies are the secondary sources.
- ♦ **Infective Period :** 5 – 9 days
- ♦ **Age :** Typhoid affects all age groups; however, it more commonly occurs in individuals of 5-19 years of age.
- ♦ **Sex :** Typhoid mainly occurs in males than in females.
- ♦ **Incubation Period :** 7-28 days.

Mode of Transmission

- ⇒ Typhoid is transmitted by contaminated food and water. High concentration of bacteria through the faeces of an infected person is exposed to the external environment and contaminates the surrounding water supply. Supply of contaminated water leads to infected food supply. The bacteria remain alive for weeks in water and dried sewage.

Clinical Presentations

- ✚ Headaches,
- ✚ Muscle aches and pains,
- ✚ Abdominal pain & discomfort,
- ✚ Fever up to 104°F,
- ✚ Diarrhoea.
- ✚ Chest congestion,

Role of Pharmacist in Educating the Public in Prevention

- **Proper Sanitation :** The important measures that should be considered to prevent typhoid infection are sanitation and hygiene. Typhoid can only transmit in environments where faeces or urine of infected person contaminate the food or drinking water. Therefore, careful food preparation and washing of hands is required for preventing typhoid infection.
- **Vaccination :** The WHO has recommended two typhoid vaccines, namely the live oral Ty21a vaccine and the injectable typhoid polysaccharide vaccine.

Amoebiasis

→ A Condition in which the intestines get infected with *E. histolytica* (a parasite) is termed as amoebiasis. Entamoebae are a group of single-celled parasites (living things that live in or on other living organisms) which infect humans and some animals. Among 6 different species of entamoeba that can infect the human gut, amoebiasis is caused only by *E. histolytica*.

Causative Agent

- *Entamoeba histolytica* is a parasite that causes amoebiasis. In the several protozoan species in the genus *Entamoeba* colonise humans, but not all of them can cause the disease. It is present in two forms, i.e., vegetative (trophozoite) and cystic (cyst).

Epidemiology

- ◆ **Source of Infection :** Consumption of infected food or water, contact with contaminated food handlers, contact with contaminated medical devices, and pregnancy are all risk factors for amoebiasis.
- ◆ **Age and Sex :** Amoebic liver abscess is 7-12 times more common in men, especially among men aged 18-50 years
- ◆ **Incubation Period :** 2-4 weeks, but can also range from a few days to years.

Mode of Transmission

- ➡ Faecal-oral pathway, directly from person-to-person or indirectly by eating or drinking food or water contaminated with faeces.
- ➡ Sexual transmission by oral-rectal contact (especially among male homosexuals).
- ➡ Vectors (flies, cockroaches, and rats).

Clinical Presentations

- ✚ Abdominal cramps
- ✚ Diarrhoea
- ✚ Fatigue
- ✚ Excessive gas
- ✚ Rectal pain while having a bowel movement (tenesmus)
- ✚ Unintentional weight loss)

Role of Pharmacist in Educating the Public in Prevention

- Improved Water Supply
- Sanitation
- Food Safety

Hookworm Infection

- Hookworm Infection is an intestinal infection characterised by itchy rash, and respiratory gastrointestinal problems. and iron deficiency anaemia due to continuous blood loss. Hookworms are parasites, i.e., they live on other living things. They get transmitted to humans through their larvae present in soil dirt contaminated with faecal matter. Hookworms mainly affect the lungs, skin, and small intestine.

Causative Agent

- The causative agents of hookworm infection are the two major types of parasitic hookworms, namely *Necator americanus* and *Ancylostoma duodenale*.

Epidemiology

- ♦ Source of Infection : It mainly occurs due to walking barefoot on contaminated soil
- ♦ Infective Period : Within 7 days.
- ♦ Incubation Period : Approximately 7-14 days.

Mode of Transmission

- ☞ Hookworm larvae transmit through the skin of a person Who comes in contact with contaminated human faeces.)

Clinical Presentations

- ✚ Headaches,
- ✚ Muscle aches and pains,
- ✚ Abdominal pain & discomfort,
- ✚ Fever up to 104°F,
- ✚ Diarrhoea.
- ✚ Chest congestion,

Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should guide people to never walk barefoot in soiled areas with a high contamination risk.
- He/she should guide people to never sit on the ground without using a barrier.
- He/she should guide people to never consume soil that may be contaminated with hookworm.
- He/she should guide people to never defecate in the soil or outdoors.

Food Poisoning

- Food poisoning, also known as food-borne disease results due to contaminated food consumption.
- Food Infection: It is caused by consuming food contaminated with bacteria or other microbes which infect the body.

Causative Agent

Food poisoning can be caused by the following agents

- **Virus** : Noroviruses
- **Bacteria**: Intestinal Infection
- **Parasites** : Giardia (Beaver Fever)
- **Toxic Agents** : Mushroom Toxins

Epidemiology

- ◆ **Effective Period**: Signs and symptoms may occur within a few hours of eating contaminated food, or may also begin days or even weeks later. Sickness caused due to food poisoning lasts from a few hours to several days.
- ◆ **Incubation Period**: 1-2 days

Mode of Transmission

- ☞ Food poisoning mainly transmits by consuming food contaminated with soil or faeces, reheated foods (stews) or raw or inadequately cooked foods (seafood, cross contamination by handling raw seafood).

Clinical Presentations

- ✚ Nausea,
- ✚ Vomiting,
- ✚ Abdominal cramping, and
- ✚ Diarrhoea which may occur all of a sudden (within 48 hours) after consuming contaminated food or drink.

Role of Pharmacist in Educating the Public in Prevention

- Safe Shopping
- Safe Storage of Foods
- Safe Food Preparation

ARTHROPOD-BORNE INFECTIONS

- ❖ Arthropod-borne infections are caused by bacteria, viruses, or protozoal parasites, and get transmitted by insects (e.g., mosquitoes, sand flies, tsetse flies, and by and others) and arachnids (e.g, ticks and mites). The viruses belonging to the families

Dengue

- Dengue is a mosquito-borne viral infection that causes a severe flu-like illness, and sometimes causes a potentially lethal complication called severe dengue. Severe dengue has a higher risk of death if not managed appropriately. Dengue virus is transmitted by the vector, *Aedes aegypti* mosquito.

Causative Agent

- Dengue is caused by group B arbovirus (dengue types 1, 2, 3, 4), which was first isolated in India in 1945 by Sabin. DEN-2 and DEN-3 are associated with shock syndrome.

Epidemiology

- ♦ **Infective Period** : 4-15 days
- ♦ **Age and Sex** : Except for those aged below 5 years, males were found to have higher notification rates of dengue than their female counterparts, and the risk difference was greatest among those aged 16-40
- ♦ **Incubation Period** : 4-10 days

Mode of Transmission

- *aegypti* is a domestic mosquito, and the most common and efficient vector. The female mosquitoes bite humans during the daytime. They feed on an infected individual's blood, and transmit the infection to another host when the blood-meal is interrupted or after an incubation period of 8-10 days during which the virus multiplies in the salivary glands. *A. albopictus*, *A. polynesiensis*, and *A. scutellaris* are the less efficient vectors.

Clinical Presentations

- Dengue virus infection may be asymptomatic or may cause undifferentiated febrile illness (viral syndrome), Dengue Fever (DF), Dengue Haemorrhagic Fever (DHF), or Dengue Shock Syndrome (DSS),

Role of Pharmacist in Educating the Public in Prevention

- **Mosquito Control** : The vectors of dengue fever and DHE. i.e., *A. aegypti*, breed in and around houses, and can be controlled by individual and community action with anti-adult and anti-larval measures.
- **Other Measures** : The infected individuals should be isolated under bed-nets for the first few days to protect against mosquitoes.
- Personal prophylactic measures include wearing clothes that cover the body entirely; using mosquito repellent creams, liquids, coils, mats, etc.; and using bed-nets for sleeping infants and young children during day time to prevent mosquito bites.
- Environmental measurements include detection and elimination of mosquito breeding places, management of roof tops, porticos and sunshades, proper covering of stored water, and observation of weekly dry day

Malaria

→ Malaria is a life-threatening disease, transmitted through the bite of an infected female Anopheles mosquito, carrying the Plasmodium parasite. The infected mosquito releases the parasite in the blood by biting an individual.

Causative Agent

- The causative agent of malaria is a protozoan parasite of the genus. The species of plasmodium responsible for malaria in human beings are *P. falciparum* and *P. vivax* causing about 80% of recognised cases of malaria and approximately 90% of deaths. Malaria is also caused by other species such as *P. ovale*, *P. malariae*, *P. knowlesi*, and *P. semiovale*. The female Anopheles mosquito acts as a vector for human beings.

Epidemiology

- ♦ **Source of infection** : a person who harbours the sexual forms (gametocytes) of the parasite in the source of infection These gametocytes are sucked by a female anopheles mosquito when it bites a sick person
- ♦ **Age** : Malaria can occur at all ages.
- ♦ **Sex** : Males are more frequently exposed to the risk of infection than female due to outdoor life
- ♦ **Incubation Period** : 12 – 14 days.

Mode of Transmission

- ➞ **Uninfected Mosquito** : A mosquito become infected by feeding on a malaria-infected person.
- ➞ **Transmission of Parasite** : If the infected mosquito now bites health individuals, the malarial parasites are transmitted to them.
- ➞ **In the Liver** : Parasites then reach the liver, where some types of them remain dormant for even a year.
- ➞ **Into the Bloodstream** : The parasites on maturing leave the liver and infect the RBCs. At this point, the symptoms of malaria are observed.

Clinical Presentations

- ✚ The infected person suffers from high fever (which comes and goes); the pattern of fever depends on the species of malarial parasite.
- ✚ At the initial stage, malaria infection seems to be like flu with high fever, fatigue, and body aches, with hot and cold stages.

Filariasis

→ Filariasis is a parasitic and infectious tropical disease, caused by the thread-like parasitic filarial worms. It is a significant health problem in many developing countries but extremely rare in Western countries. *Loa loa* is another filarial parasite of humans, transmitted by the deer fly.

Causative Agent

- The causative agent of filariasis is a parasitic nematode. *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*.

Epidemiology

- ◆ **Age** : The infection can occur at all ages; however, the infection rate is high in 20-30 years aged individuals.
- ◆ **Sex** : The infection rate in endemic areas is higher in males.
- ◆ **Migration** : Movement of people from one place to another has spread filariasis to non-endemic areas.
- ◆ **Source of Infection** : An individual with the microfilariae in peripheral blood is the source of infection.

Mode of Transmission

Filariasis is transmitted by mosquito bites harbouring infective larvae. The infection is transmitted by the following two types of mosquitoes:

- *Culex Fatigans* - Bancroftian filariasis
- *Mansonoides Mosquitoes* -Malayan filariasis

Clinical Presentations

- ✚ The most remarkable symptom of lymphatic filariasis is thickening of the skin and underlying tissues, also known as elephantiasis.
- ✚ Elephantiasis occurs in the lower extremities, rarely affecting the ears, mucus membranes, and amputation stumps.

Role of Pharmacist in Educating the Public in Prevention

- Reducing contact with the mosquito vectors, and
- Providing systemic individual and community chemotherapy.

Chikungunya

→ The term chikungunya means doubling up due to severe joint pains. It is a haemorrhagic fever caused by a Togavirus. Its clinical symptoms are almost similar to dengue haemorrhagic fever, with the exception that pains are limited to joints. Chikungunya is characterised by high fever and severe articular pains in limbs and spinal column.

Causative Agent

- Chikungunya virus is transmitted by Aedes mosquitoes.

Epidemiology

- **Source of Infection :** Chikungunya virus can spread among people by the bite of an infected mosquito
- **Age and Sex :** Infection rate is higher in females. mostly in 40-50 years age group.
- **Incubation Period :** 3-7 days (ranges between 1-12 days).

Clinical Presentations

- ✚ fever,
- ✚ chills,
- ✚ cephalalgia (headache)
- ✚ anorexia,
- ✚ lumbago (pain in the lower back).

Role of Pharmacist in Educating the Public in Prevention Control

- **Vector Control:** The Aedes aegypti mosquitoes should be the main target of control activities. Active community involvement is required for keeping water storage containers free of mosquitoes and for eradicating other breeding places of mosquitoes in and around houses and dwellings.

Surface Infections

→ Skin is the largest organ of human body that functions as first line of defence. Skin protects body from various infections but sometimes becomes infected itself. Skin gets infected from various germs, and suffers from mild to serious symptoms. Some mild infections can be treated with OTC medications and home remedies, but serious with infections require medical interventions.

- ◆ Bacterial Skin Infections:
- ◆ Viral Skin Infections:
- ◆ Fungal Skin Infection

Trachoma

→ Trachoma is a chronic infectious disease affecting the conjunctiva and cornea. It is the leading cause of the world's infectious blindness.

Causative Agent

- The causative agent of trachoma is *Chlamydia trachomatis* (a gram-negative cocci bacterium).

Epidemiology

- ◆ **Source of Infection** : Trachoma can easily spread by direct personal contact, sharing towels & cloths, and through flies that have come in contact with the eyes or nose of an infected person.
- ◆ **Infective Period** : Between 2 to 3 months.
- ◆ **Incubation Period** : 5 to 10 days.

Mode of Transmission

- Direct contact from one person to another if they sleep together,
- Indirect contact by sharing towels, kerchiefs, and pillows, and
- Mechanical transmission by flies.

Clinical Presentations

- ✚ Inflammation and scarring of the conjunctiva, which leads to inward deviation of eyelashes and lid margin.
- ✚ The eyelashes produce abrasion of the cornea, resulting in corneal ulcer, and
- ✚ If left untreated, blindness occurs.

Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should recommend sulphonamides and tetracycline antibiotics.
- Pharmacist should suggest the patient to undergo Surgery to correct eyelid deformities.
- Pharmacist should guide people to maintain proper environmental sanitation such as fly control, safe water supply, and improvement of personal and general hygiene.
- Pharmacist should provide health education on cleanliness of family members and the surrounding environment.

Tetanus

→ Tetanus is a muscular disease in which the muscles (particularly the jaw muscles) become stiff. It is caused when the causative bacteria enter the body via cuts and wounds.

Causative Agent

- The causative agent of tetanus is *Clostridium tetani* which releases an exotoxin.

Epidemiology

- **Source of Infection :** Spores are important sources of infection and are widely distributed in the soil, street dust, horse, and cow dung.
- **Incubation Period :** 3-21 days.

Mode of Transmission

- ♦ The bacterium infects a person whenever dirt enters any open cut or wound. The germs of tetanus show optimum growth in deep wounds as a result of dirty nails, tools, knives, splinters, and animal bites.
- ♦ Infants or children are also at risk of tetanus if contaminated or unhygienic instruments are used for scarification, skin piercing and circumcision.

Clinical Presentations

- ✚ Signs and symptoms of generalized tetanus include: Painful muscle spasms and stiff, immovable muscles (muscle rigidity) in your jaw. Tension of muscles around your lips, sometimes producing a persistent grin. Painful spasms and rigidity in your neck muscles.

Role of Pharmacist in Educating the Public in Prevention

General hygiene should be enhanced.

- 1) Tetanus Toxoid (TT) is used for active immunisation.
- 2) Pregnant women and children should be immunised.
- 3) All the wounds and damaged tissues should be cleaned and locally treated.

Leprosy

- Leprosy (or Hansen's disease) is a contagious disease characterised by painful white patches on the dermis and Capable of causing necrosis of nerves and muscles.
- Leprosy is of two types, lepromatous leprosy and tuberculoid leprosy. Other types of leprosy are borderline leprosy and intermediate leprosy, lying in between these two types.

Causative Agent

- The causative agent of leprosy is *Mycobacterium leprae*.

Epidemiology

- 1) **Source of Infection** : Only the multibacillary cases (e-g., lepromatous leprosy) are highly infectious.
- 2) **Age** : Infection can occur at any age.
- 3) **Sex** : Males are more commonly affected than females.
- 4) **Incubation Period** : The incubation period is long, variable, and ranges from 2-5 years.

Mode Of Transmission

- **Contact Transmission** : Leprosy is transmitted by direct (skin-to-skin) or indirect (contact with fomites) with the infectious patient.
- **Droplet Infection** : Leprosy can also be transmitted by droplet infection.

Clinical Presentations

- ✚ Presence of hypopigmented spots on the skin,
- ✚ The affected area loses its cutaneous sensitivity either partially or totally,
- ✚ The nerves get thicken,
- ✚ In the later phase, leprosy can lead to several complications.

Role of Pharmacist in Educating the Public in Prevention

- Detecting leprosy cases and tracing their contacts such as children belonging to houses where there is a leprosy patient.
- There must be no contact between the patient and the healthy person.
- An acute patient should be isolated selectively or should be hospitalised.
- The infected person should be treated with dapsone.
- Patient should be rehabilitated with suitable work, especially psychologically and socially.

Sexually Transmitted Diseases (STDS)

- The term Sexually Transmitted Diseases refers to a variety of clinical syndromes and infections caused by pathogens that can be acquired and transmitted through sexual activity.
- Some examples of STDs include AIDS, syphilis, gonorrhoea, chlamydia, genital herpes, genital warts, hepatitis B, Human Papilloma Virus (HPV) infection, trichomoniasis (parasitic infection), molluscum contagiosum, Pelvic Inflammatory Disease (PID), scabies, etc.

Syphilis

- Syphilis is a sexually transmitted disease which is not as common as other STIs, however if left untreated it can cause very serious health problems in both males and females.

Causative Agent

- The causative agent of syphilis is *Treponema pallidum* (a spiral bacterial spirochete which is 15µm long and visible in dark field microscopy with screw-like motions).

Epidemiology

- ♦ **Source of Infection :** The most common route of transmission is via contact with an infected person's sore during sexual intercourse. Bacteria enter the body through minor cuts or abrasions present on the skin or mucous membranes.
- ♦ **Infective Period :** 10 days to 3 months
- ♦ **Age and Sex :** Highest rates among women were among those aged 20-24 years and those aged 25-29 years.
- ♦ **Incubation Period :** 21 days

Mode of Transmission

- The bacterium is transmitted through direct mucous membrane contact. An infection occurs in 30% of sexual intercourses with infected partners. A transmission is possible even with less intensive contact. Rarely transmission may occur through blood transfusion.

Clinical Presentations

- ✚ This rash is usually not itchy and may be accompanied by wartlike sores in your mouth or genital area. Some people also experience hair loss, muscle aches, a fever, a sore throat and swollen lymph nodes. These signs and symptoms may disappear within a few weeks or repeatedly come and go for as long as a year.

Role of Pharmacist in Educating the public in Prevention

- Detecting the cases and tracking the contacts
- Treating with drugs like PAM or benzathine penicillin
- Avoiding promiscuous sexual contact.
- Using contraceptive device during sexual intercourse
- Providing health education on syphilis and its problems.

HIV / AIDSs

→ AIDS (Acquired Immunodeficiency Syndrome) is a condition characterised by a group of signs and symptoms occurring together, as a result of decreased efficiency of the immune system, caused by the HIV.

Causative Agent

The causative agent of AIDS is Human Immunodeficiency Virus (HIV), which may be of the following two types:

- 1) **HIV-1** : Most common in sub-Saharan Africa and throughout the world, and
- 2) **HIV-2** : Most common in West Central Africa, parts 2) of Europe, and India.

Epidemiology

- ♦ **Source of Infection** : HIV patients and carriers are the sources of infection.
- ♦ **Infective Material** : Blood and semen of infected persons are the infective materials.
- ♦ **Age** : Sexually active persons (20-49 years) are mostly infected with the virus.
- ♦ **Incubation Period** : 6 years or more.

Mode of Transmission

- Transmission of HIV primarily takes place via three routes:
- Through unprotected sexual intercourse with an infected partner.
- Through contaminated blood transfusion , using blood products or using contaminated needles for piercing or tattooing and
- Through placental transmission from mother to child during pregnancy , birth, or breastfeeding

Clinical Presentations

- ✚ As the virus continues to multiply and destroy your immune cells — the cells in your body that help fight off germs — you may develop mild infections or chronic signs and symptoms such as: Fever. Fatigue. Swollen lymph nodes — often one of the first signs of HIV infection.

Role of Pharmacist in Educating the public in Prevention

- HIV testing
- Treatment of HIV infection
- Treatment of HIV in key patient populations
- HIV treatment failure
- Management of HIV disease state complications
- Treatment and prevention of opportunistic infections
- Prevention of HV infection
- HIV education
- Social services and HIV infection
- Professional engagement

Chapter 5

Health System and National Health Programmes

Topics

HEALTH SYSTEMS IN INDIA

Organisation and Administration of Health System in India

Central level

State level

District level

NATIONAL HEALTH PROGRAMMES



Health System and National Health Programmes

HEALTH SYSTEMS IN INDIA

- According to WHO, health system is the sum total of all the organisations, institutions and resources whose primary purpose is to improve health.
- Health system includes health activities, health programmes, medical care providing institution i.e., hospitals, clinics and primary health care centres and the policies expressed by the government to deliver optimal health care for its citizens.
- Health system should be convenient, well-organised, economical, and of good quality.

Health system generally includes the following:

- Growth of health policies, along with their implementation plan and development of regulatory system for health services.
- Define and develop the institutional framework to provide the health services in the range of this system.
- Assign and organise financial and human resources for its functioning.
- Organise, govern and provide the health services.

Organisation and Administration of Health System in India

- The science of formulating and regulating government agencies whose goal is to promote the physical, mental and social well-being of the people of the country is known as health administration.
- India comprises of 28 States and 8 Union territories
- In the constitution of India it is mentioned that the states are mainly independent in matters related to the provision health care to the people.
- Every state has well- established separate health care delivery system, Independent of the Central Government.

There are three levels of health system in India:

1. Central level
2. State level
3. District level

CENTRAL LEVEL

Central level consists of mainly three organisations of health system:

- Union ministry of health and family welfare
- Directorate general of health services
- Central council of health,

Union Ministry of Health and Family Welfare

- The Union Ministry of Health and Family Welfare is regulated by a Cabinet Minister, a Minister of State, and a Deputy Health Minister.
- They are politically appointed to serve dual role, i.e., political as well as administrative duty for health care.

Organisation

At present, the union health ministry consists of the following departments:

1. Department of Health.
2. Department of Family Welfare.
3. Department of Indian System of Medicine and Homoeopathy.
4. Department of Health Research.

Functions

- The functions of Union Health Ministry are enumerated in the seventh schedule of Article 246 of the Constitution of India under:
 - The Union list
 - The State list
 - The Concurrent list

Union List

- ✚ The Central government manages these functions listed under the union list:
- ✚ It manages, international health relations and administration of port-quarantine.
- ✚ It takes care of Central Health Institutes, like All India Institute of Hygiene and Public Health, Kolkata; National Institute for Control of Communicable Diseases, Delhi, etc.
- ✚ It coordinates with states and other ministers to promote health.

State List

- ✓ Administration and control of the health care workforce.
- ✓ Establishment of government funded national health programme
- ✓ Regulation of food and drug quality.

Concurrent List

- ➔ To prevent of transmission of communicable diseases from individual to individual.
- ➔ To regulate of drugs and poisons.
- ➔ To record vital statistics.
- ➔ To plan economic and social health welfare
- ➔ To control population and ensure family planning.

Directorate General of Health Services

- The Directorate General of Health Services (Dte.GHS) stores complete technical knowledge regarding public health, medical education, and health care.
- It is an associated organisation of Ministry of Health and Family Welfare.
- Organisations
 - Deputy DGHS for Medical Care and Hospital
 - Deputy DGHS for public health
 - Deputy DGHS for General Administration

Functions

- ✓ Medical Education,
- ✓ Central Health Education Bureau,
- ✓ National Medical Library,

Central Council of Health

- On August 9, in the year 1952, The Central Council of Health was established by a Presidential Order under Article 263 of the Constitution of India. It was created for developing the synchronised and combined action between the centre and the states in the implementation of all the programmes and measures concerning to national health

Organisation

- The chairman of Central Council of Health is the Union Minister of Health and State Health Ministers are its members.

Function

- ✓ To examine and propose broad outlines of policy in respect to the matters regarding health in all its aspects like the provision of remedial and preventive care, environmental hygiene, nutrition, health education and the promotion of facilities for training and research.

STATE LEVEL

- In history, the first achievement in the state health administration was in the year 1919, when the states (territories) achieved autonomy (independence), under the Montague-Chelmsford reforms, from the Central Government related to public health.
- Some system of public health organisation was created by all the states till 1921-22. Additionally, the states attain further autonomy by the Government of India Act, 1935.
- The ultimate authority which is liable for the health services within the jurisdiction is the State.
- Minister and with a Secretariat under the charge of Secretary/Commissioner (Health and Family Welfare) belonging to the team of Indian Administrative Service (IAS) lead the state level organisation which is under the State Department of Health and Family Welfare

Function

- ☑ To create, review and modify the outline of broad policy.
- ☑ To conduct policies programmes, etc.
- ☑ To ensure coordination with Government of India and other state Governments.
- ☑ To regulate functioning of administrative machinery, i.e., in a smooth and effective way.

DISTRICT LEVEL

- District is the most essential level in the administrative unit which defines the Geographical boundary and population: and is important for implementation of medical health services.
- There are 6 main types of administrative area within each district, namely, Sub- division, Tahsils (Talukas), Community Development Blocks, Municipalities and Corporations (urban area), Villages, and Panchayats

Function

- ✓ It provides independent segment of National Health System
- ✓ It provides middle level management organisation.
- ✓ District works as the principal unit of management in India under a Collector.

NATIONAL HEALTH PROGRAMMES

- Control/eradication of communicable diseases, upgrading of environmental cleanliness, rising the standard of nutrition, population control, and enhancing rural health are the functions for which the National Health Programs have been established by the Central Government.
- Various international organisations (WHO, UNICEF, UNFPA, and World Bank) as well as foreign organisations (SIDA, DANIDA, NORAD, and USAID) have provided technical and material aid in the application of these health programmes.

Role of Pharmacist in National Health Programmes

- A community pharmacist has direct contact with the public and his/her services are in high demand by the public and patients. He/she provides prescribed medications, and, in some situations OTC drugs (which do not need a prescription)
- The popular slogans of 'patient-centered practise' and 'drug abuse prevention' were put into reality.
- National health promotion campaigns on a variety of A community pharmacist can participate in local and drug-and health-related subjects.

NATIONAL ACUTE RESPIRATORY TRACT INFECTION (ARI) CONTROL PROGRAMME

- The aim of National Acute Respiratory Tract Infection (ARI) Control Programme is to reduce deaths of children below 5 years of age due to pneumonia and other childhood disorders.
- It ensures good quality of care to under-five children who are hospitalised due to severe forms of pneumonia.

Objectives

- To lower the death rate of children below 5 years of age due to pneumonia
- To minimise the seriousness of death from pneumonia in children.)
- To justify the use of drugs in Acute Respiratory Tract Infection (ARI).

REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAM (RNTCP)

- National Tuberculosis Programme (NTP) was launched in 1962; still, the treatment success rates were excessively low and the death and default rates due to tuberculosis remained high.

Objectives

- Achievement of at least 85% cure rate of infectious cases of tuberculosis through DOTS, involving peripheral health representatives.
- Expansion of case-finding activities through quality sputum microscopy to detect at least 70% of estimated cases.

NATIONAL ANTI MALARIA PROGRAMME

- In the year 1982, the National Drug Policy on Malaria was first formulated, and then subsequently reviewed and revised.
- Current National Drug Policy for Malaria (2010) has been formulated with the aim to provide more effective antimalarial drugs and drug resistance status in the country.

Objectives

- To prevent deaths and morbidity due to malaria.
- To maintain on-going socioeconomic development.
- To reduce API up to 1.3 or less in the 11th Five Year Plan.
- Minimum 50% reduction in mortality due to malaria.
- To halt and reverse the incidence of malaria,

NATIONAL FILARIAL CONTROL PROGRAMME (NFCP)

- The National Filarial Control Programme (NFCP) was initiated in the country in 1955 after pilot project in Orissa from 1949-1954.
- The main objective of this programme is to determine the problem, initiate control measures in widespread areas, and to instruct staff to guide the programme.

Objectives

- To conduct surveys in different parts of the states where the problem was prevalent for determining the extent of frequency, infection type, and their vectors.
- To instruct professional and supportive staff required for the programme.
- To control filaria in urban areas via repeated anti-parasitic measures.

NATIONAL LEPROSY ERADICATION PROGRAMME (NLEP)

- For eradicating leprosy in India, Eradication Programme is a health scheme of the Ministry of Health and Family Welfare, Government of India. In 1983, this scheme was launched as a continuation of the National Leprosy National Leprosy Control Program (1955).

Objectives

- To facilitate early detection via active surveillance by trained health workers.
- To provide regular treatment by Multi-Drug Therapy (MDT) at fixed centres in nearby villages of moderate to low endemic areas.
- To increase health education and public awareness campaigns for removing social stigma attached to the disease.
- To facilitate suitable medical rehabilitation and leprosy ulcer care services.

NATIONAL AIDS CONTROL PROGRAMME (NACP)

- National AIDS Control Programme was launched in India in 1987.
- The Ministry of Health and Family Welfare established National AIDS Control Organisation (NACO) as a separate wing to implement and monitor the various programme components.
- NACP aims to prevent the transmission of HIV, to reduce the rates of morbidity and mortality associated with HIV infection, and to minimise the socio-economic impact of HIV infection.

Objectives

- To prevent infection by covering the high-risk groups with Targeted Interventions (TIs) and scaled up interventions in the general population.
- To provide greater care, support, and treatment to large number of HIV and AIDS (PLHA) patients.

STD CONTROL PROGRAMME

- In 1946, the National Sexually Transmitted Diseases Control Programme (NSTDsCP) was initiated. programme aimed to focus on the health seeking This behaviour of STD socialembarrassment with these infections.
- In 1992, the NSTDsCP was made an essential part of the National patients and to reduce the AIDS Control Programme

Objectives

- To explain the epidemiological effect of STDs.
- To discuss the ways for minimising the risk for STDs.
- To check out how condoms can reduce the risk for STDs.
- To illustrate the clinical presentation of STDs.
- To layout the management, complication and prevention plan of STDs.

IODINE DEFICIENCY CONTROL PROGRAMME

- Iodine being an essential micronutrient is required for normal body growth and mental health development.
- It is an essential element for human survival; thus, Iodine Deficiency Disorder (IDD) is considered a serious threat.
- For preventing, controlling and eliminating iodine deficiency disorders, National Disorders Iodine Deficiency (NIDDCP) was Control Programme implemented.
- It also provides support to the States for establishing IDD cell and IDD monitoring laboratories for quality control of iodised salt and for monitoring urinary iodine excretion.
- This programme also conducts survey of goitre and health education activities.

Objectives

- To evaluate the extent of IDD problem in the country.
- To evaluate the effect of control measures after every 5 years.
- To check the quality of available iodised salt and to estimate their urinary iodine excretion pattern.
- To conduct IEC campaigns for promoting community participation in implementing the program.

EXPANDED PROGRAMME ON IMMUNISATION (EPI)

- In 1974, the Expanded Programme on Immunisation established for was developing and spreading immunisation programmes all over the world.
- In 1977, the goal was set to immunise every child in the world against diphtheria, pertussis, tetanus, poliomyelitis, measles, and tuberculosis by 1990.
- For controlling and eradicating infectious diseases, the Expanded Program on Immunisation (EPI) is used as a distinctive evidence-based tool.
- Childhood communicable diseases, which can cause death and severe disability, are prevented by EPI.

Objectives

- To provide access to suitable vaccines for targeted groups (older children, adolescents, and adult pregnant women) for controlling disease and achieving better health.
- To minimise maternal mortality rate.
- To eradicate measles infection.
- To eradicate maternal and neonatal tetanus.
- To prevent pulmonary tuberculosis.

NATIONAL FAMILY PROGRAMME WELFARE (NFWP)

- Family planning is defined as planning by individual or couples to have only the children they want and when they want them for responsible parenthood.
- Planning of birth as well as welfare of whole family by means of total family health care are included under family welfare.
- In 1951, the National Family Planning Programme was initiated; and in 1977, it was renamed as the National Family Welfare Programme by the government of India.

Objectives

- To promote acceptance of small family size norm.
- To promote the use of spacing methods.
- To arrange for clinical and surgical services for achieving the targets.
- To reduce population growth rate.
- To provide need-based demand for high quality integrated reproductive child health care.

NATIONAL DIABETES CONTROL PROGRAMME

- National Diabetes Control Programme was initiated by the Government of India during the 7th Five Year Plan in 1987 in some districts of Tamil Nadu, Jammu & Kashmir, and Karnataka. But, this programme could not be expanded further due to lack of funds in succeeding years.

Objectives

- To prevent diabetes by identifying high risk individuals and through early interventions via health education.
- To facilitate early diagnosis and treatment of diabetes to reduce morbidity and mortality among high risk group individuals.
- To provide equal opportunity for physical achievement and academic achievement for diabetic patients.
- To provide rehabilitation care to partially or completely handicapped diabetic patients.

PULSE POLIO PROGRAMME

- In 1995, Pulse Polio Immunisation Programme was launched in India, with the global initiative of eradicating polio in 1988, following World Health Assembly resolution.
- Every year during National and Sub-national immunisation rounds, polio drops are administered to 0-5 years aged children (in high risk areas).
- On each National Immunisation Day (NID), approximately 172 million children are immunised against polio.

Objectives

- To hinder the transmission of wild poliovirus by the end of 2014 and new cVDPV outbreaks within 120 days of confirmation of the first case.
- To accelerate the disruption of transmission of all poliovirus and to strengthen the immunization systems.
- To achieve certification of the eradication and containment of all wild poliovirus in all WHO regions by end of 2018.

NATIONAL CONTROL CANCER PROGRAMME (NCCP)

- National Cancer Control Programme (NCCP) is a public health programme that reduces the number of cancer cases and deaths.
- It also improves the quality of life of cancer patients by implementing efficient, reasonable and evidence-based strategies for prevention, early diagnosis, treatment and palliation of cancer.
- In 1975, the NCCP was launched. Later, in the year 1984 85, it was revised with more focus on primary prevention and early detection of cancer.
- The programme introduced various schemes to intensify cancer control activities.
- These schemes were modified (under the 10th Five Year Plan) to increase the existing facilities.

Objectives

- To provide primary prevention by health education on the harmful effects of tobacco consumption and necessity to maintain genitals hygiene for preventing cervical cancer.
- To provide secondary prevention by early detection and diagnosis of cancer through screening methods and educating patients on how to self-examine,
- To intensify the existing cancer treatment facilities.
- To facilitate palliative care in terminal stage cancer.

NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

- In 1970, the National Nutritional Anaemia Prophylaxis Programme was launched.
- Later, it was revised and expanded under National Iron Plus Initiative (NIPI) Programme in 2011 to include beneficiaries from all age groups, such as children aged 6-59 months and 5-10 years, adolescents aged 10-19 years, women of reproductive age, and pregnant and lactating women.
- lower than expected, and none of them had folic acid concentration that was higher than predicted.

INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) PROGRAMME

- The Integrated Child Development Services (ICDS) scheme was launched on 2nd October, 1975.
- It is a flagship programme of the Government of India, and is one of the world's largest and unique programmes for early childhood care and development.
- The beneficiaries under this scheme are children of 0-6 years age, pregnant women, and lactating mothers.

Objectives

- To enhance nutritional and health status of children of 0-6 years age.
- To establish the foundation for proper psychological, physical and social development of the child.
- To minimise the occurrence of mortality, morbidity, malnutrition, and school dropout.
- To achieve efficient co-ordination of policy and implementation between the various department to promote child development.
- To build-up the potential of mother to take care of the health and nutritional demands of her child via proper nutrition and health education.

MID-DAY MEAL PROGRAMME (MDMP)

- mid-day healthful lunch, to government government-aided schools.
- On 28th instruction was passed by the Supreme Court of India stating, Territories to implement the Mid-Day Meal Scheme by providing every child in every Government and Primary School with prepared midday meal".

Objectives

- To increase school admission and attendance.
- To improve socialisation among children belonging castes.
- To address issue malnutrition among children.
- To facilitate social empowerment of women employment.

Mid-Day Meal Scheme

- From 15th August, 1995, Mid-Day Meal Scheme was initiated in India under the name of National Programme of Nutritional Support to Primary Education (NPNSPE). In October 2007, the NP-NSPE was renamed as National Programme of Mid-Day Meal in Schools, which is popularly known as the Mid-Day Meal Scheme (MDMS).

Objectives

- To increase the admission of children belonging to disadvantaged sections in schools.
- To increase school admission and attendance.
- To maintain children studying in classes I-VIII.
- To provide nutritional support to children of primary stage in drought affected areas.

NATIONAL MENTAL HEALTH PROGRAMME

- The fundamental and essential component of health is mental health.
- According to the WHO, mental health is defined as a "state of well-being in which an individual realises his/her abilities, can cope with the normal stressors of life, and can work productively, and is able to make a contribution to his/her community.
- In 1982, the National Mental Health Programme (NMHP) was launched to ensure mental health care services for all, especially for the community at risk and under-privileged section of the population.
- This programme also encourages application of mental health knowledge in general health care and social development.

Objectives

- To provide knowledge of mental health in general health care and social development.
- To encourage application of mental health knowledge in general healthcare and social development
- To encourage community participation in mental health service development.
- To increase human resources in mental health subspecialties.
- To prevent and treat mental and neurological disorders and associated disabilities.

ADOLESCENT HEALTH PROGRAMME

- A health programme for adolescents of 10-19 years age was launched by the Ministry of Health and Family Welfare to target their nutrition, reproductive health, substance abuse, and other issues.
- Adolescent health gained power as a priority focus area in the last few years.
- Over time, the view point of health has transformed into a holistic interconnected agenda under the Sustainable Development Goals (SDGs) with greater understanding of social factor of health and incorporation of the discourse of well-being.
- Rashtriya Kishore Swasthya Karyakram (RKSK)
- On 7th January 2014, the Government of India launched Rashtriya Kishore Swasthya Karyakram (RKSK, nation's first comprehensive adolescent health programme) in New Delhi.
- According to RKSK, adolescents are girls and boys of 10-19 years age, in urban and rural areas, married and unmarried, poor and wealthy, in school or out of school.
- This definition helps to address lots of problems of adolescents across various groups and categories.

Objectives

- To improve nutritional and health status of girls of 11-18 years age.
- To guide adolescent girls for improving or upgrading home-based vocational skills.
- To create awareness on health, hygiene, nutrition, family welfare, home management, and child care
- To acquire a better understanding of their environment-related social issues and effect on their lives.

NATIONAL GUINEA WORM ERADICATION PROGRAMME (GWEP)

- In 1983-84, the National Guinea Worm Eradication Programme (GWEP) was launched by the Government of India as a centrally-sponsored scheme on a 50:50 sharing basis between Centre and State Government.
- The objective of this programme was to eradicate guinea worm disease from India.

Objectives

- To provide health education.
- To develop trained manpower.
- To provide and maintain safe drinking water supply in guinea worm endemic villages.
- To provide simultaneous evaluation and operational research.

NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS (NPCB)

- The National Program for Control of Blindness (NPCB) was launched as a 100% centrally sponsored program in 1976.
- The activities included in the program are establishment of Regional Institute of Ophthalmology (RIO), upgradation of medical colleges and district hospitals and block level primary health centres, development of mobile units, and employing required manpower in eye care units for providing ophthalmic services.

Objectives

- To reduce the occurrence of preventable blindness by identifying and treating curable blind at primary, secondary and tertiary levels, based on the valuation of overall burden of visual impairment in the country.
- To develop and strengthen the strategy of NPCB for "Eye Health for All" and preventing visual impairment by providing comprehensive universal eye-care services and quality service delivery.
- To enhance community awareness on eye care and emphasise on preventive measures.
- To increase and expand the research for prevention of blindness and visual impairment.
- To secure participation of voluntary organisations/private practitioners in delivering eye care.

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Chapter 6

DISASTER

MANAGEMENT

Topics

DISASTER MANAGEMENT

Earthquake

Cyclone

Management of a Flood

Management of a Landslide

Role of Pharmacist in Disaster Management



DISASTER MANAGEMENT

- The term disaster comes from the French word *desastre*, which is a combination of two words, *ile*, *des* (means bad) and *aster* (means star).
- So, the word refers to a bad or evil star.
- Though, this is a very constricted conception of disaster, a disaster in this context refers to any circumstance in which normality in a society is abruptly disrupted, resulting in widespread harm to life and property.
- Disaster management refers to a coordinated effort to plan and implement strategies to eradicate disasters, be prepared for them, successfully handle them, and to prevent them in order to reduce or eliminate the disaster effects, Prevention, preparedness, reaction, and recovery are the four key stages of disaster management.

Advantages of Disaster Management

- ❖ It involves predicting a forthcoming threat and taking prior safety measures to reduce the disaster effects,
- ❖ It involves mitigation and responsive measures to reduce the disaster effects.
- ❖ It involves recovery measures that help the community in recovering and returning to their normal lives.
- ❖ It involves people and offers them a sense of ownership over the materials provided or methods incorporated in education and public awareness.
- ❖ It targets particular communities to fulfil their urgent requirements.
- ❖ It empowers or boosts people with the knowledge and abilities they need for helping themselves at the time of disaster when outside help is still on the way.

Types of Disasters

- Natural hazards, such as earthquakes, landslides, cyclones, volcanic eruptions, fires, floods, and cyclones, kill many people and destroy property each year.
- Natural disasters have become more frequent and severe because of the world's rapidly growing population and its growing concentration in dangerous environment.

Earthquake

- One of the most dangerous natural disasters is an earthquake, which is the sudden shaking of the earth crust.
- It can strike at any time of the year, at any hour of day or night, with sudden impact, and little or warning sign, because of which forecasting becomes difficult.
- The vibrations of an earthquake have a varied frequency and The actual rupture process last for a few seconds to 1 minute (for a major earthquake), An earthquake has the to demolish buildings and infrastructure within few seconds, and kill or injure the residents.
- It destroys entire communities, and also has the potential to destabilise the government, economic status, and social structure of the country

Effects of an Earthquake

Earthquakes have primary violent effects, accompanied with long-lasting secondary effects.

Following are the primary and secondary effects of earthquakes:

- Destruction of Nature and Property
- Diseases
- Lack of Resources

Remedial Measures for an Earthquake

→ Following precautions should be taken before, during, and after an earthquake:

Before an Earthquake :

- Bottled drinking water non-perishable food items, a first-aid kit. torch light, and a battery operated radio (with extra batteries) should always be kept in a designated area.
- All the family members should be taught to turn off electricity, gas, and other utilities.
- Areas of the house where family can take shelter during an earthquake should be identified.

During an Earthquake:

- People should take cover under a table or other strong furniture: kneel, sit, or stay close to the floor. They should hold on to furniture legs for balance, and be prepared to move if the cover
- They should kneel or sit close to the floor next to a structurally strong interior wall, if a sturdy cover is not near. They should keep their hands. on the floor for balance.
- iii)They should not run outside if inside, and should never use the elevator.

After the Earthquake:

- People should protect their feet from debris by wearing shoes or slippers.
- They should be prepared for aftershocks, following the initial tremor,
- They should check for fire hazards and should not use candles or lanterns.

Cyclone

→ Cyclone is a low atmospheric pressure area surrounded by high atmospheric pressure areas, resulting in swirling atmospheric disturbances and violent winds moving in the Northern Hemisphere in anticlockwise direction and in the Southern Hemisphere in clockwise direction. It mostly occurs in tropical and temperate climates around the world. Based on the strength and speed of cyclonic winds, cyclonic disturbances (low pressure zones) are classified

Effects of a Cyclone

- Strong Winds
- Rainfall and Flooding

Remedial Measures for a Cyclone

→ Following precautions should be taken before, during, and after a cyclone:

Before a Cyclone:

- People should watch on weather and listen to radio or TV. They should be alert about the community warning systems loudspeakers, bells, conches, drums or any traditional warning system.
- They should know the safest route to reach the nearest cyclone shelter/safe house.

During a Cyclone:

- People should disconnect all electrical appliances and turn off gas.
- If the building starts crumbling, they should protect themselves with mattresses, rugs or blankets under a strong table or bench or hold on to a solid fixed object.
- They should listen to the transistor radio for updates and advice.

After a Cyclone:

- People should not go outside until officially advised to be safe.
- They should check for gas leaks, and should not use electric appliances, if wet.
- They should listen to local radio for official warnings and advice.)

Management of a Flood

- Floods are one of the most common natural disasters that result in death.
- Each year, over 200 flood-related deaths are reported, with more than half of them involving vehicles as people attempt to drive through floodwaters.
- Floods can destroy houses and farms, displacing families, pets, and livestock, damaging crops, and disrupting agriculture processes.

Management of a Landslide

- Landslides refer to the mass movement of rocks, rubble, or earth down a slope, and include a wide range of motions whereby falling, sliding and flowing under the influence of gravity dislodges earth material.
- They frequently occur in association with earthquakes, floods, and volcano eruptions. Prolonged rains might cause a major blockage of the flow or river for a period of time.
- When river blocks build, they cause destruction on populations downstream on exploding.
- Landslides have been a major and extensively spread natural disaster in India's steep terrain, notably the Himalayas.
- They frequently damage life and property and are a major source of concern.

Following steps can be taken for landslide management:

Before a Landslide:

- People should prepare an emergency kit and a family communication strategy.
- They should be prepared for landslides by following proper land-use procedures and not building their houses near steep slopes, close to mountain edges, near drainage ways, or along natural erosion valleys.

During a Landslide:

- People should stay inside
- They should take cover under a desk, table, For other sturdy furniture.

After a Landslide:

- People should stay away from the sliding area.
- They should inspect the area around the slide for injured or trapped people. If trained, they can provide first aid.

Role of Pharmacist in Disaster Management

Role of Pharmacist in an Emergency Response Team (ERT)

→ Pharmacists play a critical role in the healthcare system as they are dependable and approachable healthcare providers. They are on hand to assist the treatment of incoming patients and to ensure that other patients in the containment zones continue to receive care.

Following are some of the reasons why a pharmacy emergency response team should be established:

- Skilled Manpower
- Drug Knowledge
- Community Liaison
- Access to Chemicals and Laboratories
- Counselling and Support

Roles and Responsibilities of National Pharmacy Emergency Response Team (NAPERT)

- NAPERT's functions and responsibilities are designed to reduce and control the effects of a healthcare
- Provision of Medicines and Medical Support without Interruption
- Providing Medical Information without Bias
- Community Healthcare Professional
- Medicine and Medical Devices Distribution and Management

Chapter 7

PHARMACOECONOMICS

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Topics

PHARMACOECONOMICS

HEALTH INSURANCE

Health Expense Insurance

Disability Income Insurance

Health Insurance Products

Claim Process

HEALTH MAINTENANCE ORGANISATIONS (HMOS)

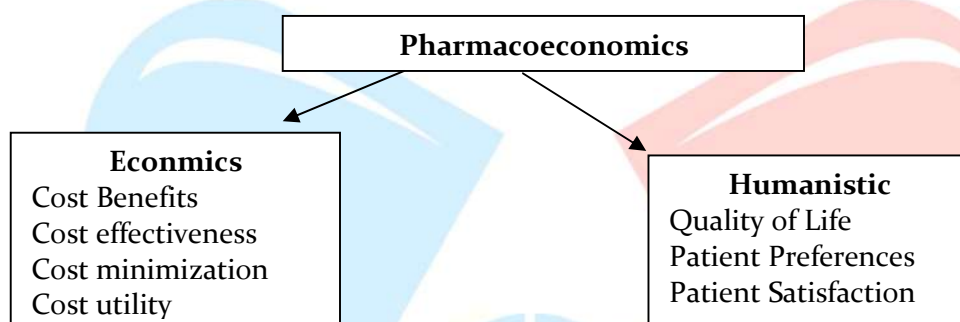
HEALTH SPENDING

OUT-OF-POCKET EXPENSES

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PHARMACOECONOMICS

- Pharmacoeconomics is the branch of economics that uses cost-benefit, cost-effectiveness, cost minimisation, cost-of-illness and cost-utility analyses for comparing pharmaceutical products and treatment strategies.
- Pharmacoeconomics is a part of health economics focusing on economic estimation of drugs. Health research results and Patient-Reported Outcomes (PRO) target understanding the patient value in relation to the influence of disease and its treatment on physical working and psychosocial health, known as Health-Related Quality of Life (HRQL).



Objectives

- To offer an outline of the issues and theory that lie at the heart of pharmacoeconomics.
- To show its application to make decisions about drug therapy.
- To show its application in decreasing financial burden on the consumers (by insuring global pricing policy) for effective managing of healthcare system as pharmacoeconomics aims to use the limited resources more effectively for expansion of healthcare benefit at lower cost.

Related Terminologies

- **Pharmacoeconomics** : It is the branch of health economics that deals with the evaluation of the costs and consequences of therapeutic decision making.
- **Cost of Drug** : It is the total resources spent in making the drug or drug preparation. It is the expense paid to the suppliers.
- **Quality Adjusted Life Years (QALY)** : It is a summary of quality and quantity of life.
- **Utility Unit** : It evaluates the changes in a patient's satisfaction, or sense of safety as an effort to calculate the approved result from moving from one state of health to another as concerns of the use of drug therapy.
- **Quality of Life** : It involves physical and psycho social dimensions of life. Physical dimensions include presence or absence of ache and immobility; while psychosocial dimensions include level of anxiety, depression and reduced ability of the patient to deal with issues.

Evaluation Methods of Pharmacoeconomics

- The management of limited healthcare resources and medical practice is offered by health care economic evaluation.
- Health care economics help the decision makers to make choices, which are compared with the expected consequences resulting from the adoption of one strategy over another.

The evaluation methods of pharmacoeconomics are

- Cost Minimisation Analysis (CMA);
- Cost Benefit Analysis (CBA);
- Cost Utility Analysis (CUA) and;
- Cost Effectiveness Analysis (CEA).

HEALTH INSURANCE

- Health or medical insurance offers monetary protection for hospitalisation and medication at the time of accidents and some illnesses of required amount for a specific limit.
- Health insurance policy is a lawful agreement between a person or group of persons and a company or any government programme, which shows the way medical bills of the individual or group are paid.
- Health insurance policy is a legal document that contains specific type of data about the policy.
- It affects the individual or group who buys the policy, the company or government that provides or sells the policies, and physicians and others providers who get the insurance expenses.
- These insurance are given against the loss of sickness or body injury.
- It provides coverage for medicines, appointment with the doctor, hospitalisation, and other medical costs.

Salient Features of Health Insurance

- ✚ **Premium** : It is the amount the policyholder or his/her sponsor (employer) plans to pay monthly for purchasing the medi-claim and health insurance.
- ✚ **Broad Coverage** : The basic medical insurance provides security for all the vital medical expenses and other expenses of the illness or injury.
- ✚ **Deductible** : A deductible is the amount of money that you are responsible for paying toward an insured loss. When a disaster strikes your home or you have a car accident, the deductible is subtracted, or "deducted," from what your insurance pays toward a claim.
- ✚ **Co-Payment** : It is the payment made by the insured person for certain visits or services. It is required to be paid each time when certain services are used. For example, co-payment is when a person may pay 500 for a doctor visit.
- ✚ **Co-Insurance** : Coinsurance is the amount an insured must pay against a health insurance claim after their deductible is satisfied. Coinsurance also applies to the level of property insurance that an owner must buy on a structure for the coverage of claims.

- ✚ **Coverage Limits :** An insurance coverage limit determines the maximum amount of money an insurance company will pay for a covered claim.
- ✚ **Capitation :** Capitation is a fixed amount of money per patient per unit of time paid in advance to the physician for the delivery of health care services.

Classification of Health Insurance

Health insurance policies are classified as follows :

1. Health Expense Insurance
2. Disability Income Insurance

Health Expense Insurance

- ❖ **Hospital Insurance :** Health insurance is essential and offers various elements of medical cover for humans. It covers the illness, injuries and treatment expenses for a person. It does not cover the hospital expenses. Thus a person needs hospital insurance.
- ❖ **Surgical Expense Insurance :** It offers protection on the surgeon's fee of an operation. The policy states the maximum fee to be insured on a list of operations. In the policy, more premium is charged on the higher fee. Normally, people get both, the hospital and surgical insurance.
- ❖ **Physician Expense Insurance :** It covers the expenses of care given by the physician, except any surgery or operation.
- ❖ **Dental Insurance :** It covers the dental charges related to dental care, and offers wide coverage, like free preventative services such as cleanings. It is available in individual, family or group dental insurance plans.

Disability Income Insurance

- Disability income insurance refers to a situation in which the amount earned is not due to illness or an accident.
- It is similar to life insurance, but people do not buy it as often because the benefits from workers' compensation, social security, and successful negligence lawsuits can provide disability income.
- When other sources of funds are limited or non-existent, these can be purchased.
- According to the period covered, disability income insurance can be either short-term or long-term.

Health Insurance Products

- The insurance providers in India offer several types of health covers for various types of market. Based on the market's needs, the following health insurance policies are designed:
- Individual versus Family Health Insurance
 - Travel Health Insurance
 - Group Health Insurance
 - Critical Illness Insurance
 - Overseas Medi-claim
 - Low-cost Medi-claim
 - Senior Citizen Medi-claim

Claim Process

- When an insured person is hospitalised or faces a medical emergency, health insurance plan comes into Health insurance claim occurs the hospitalisation or medical expenses are covered health insurance In case of medical emergency, filed, company pays the medical bills.

Advantages of Health Insurance

- ✓ **Prevention** : The primary benefit of having health insurance is disease prevention through frequent check-ups and lifestyle changes, based on the doctor's recommendations. It contributes to residents' health and saves money by lowering the healthcare costs.
- ✓ **Less Financial Burden** : After having health insurance, people will have peace of mind. If an insured person notices a health problem, he/she can contact a doctor and receive treatment without suffering any financial strain.
- ✓ **Less Lost Time** : An insured person can take time off from work to see a doctor if they are unwell. They can return to work in one or two days if the illness is not serious. It benefits both, the employee and the company, because the process takes less time.

Disadvantages of Health Insurance

- ✚ **Premiums and Coverage** : The downside of health insurance is its high cost. The insured is liable for paying the monthly premium, which adds to the burden. Also, there is a possibility that an increase in payment can result in extra coverage. Various health insurance firms are recently dropping the sum of coverage as well as the services they provide,
- ✚ **Complicated Rules** : Another downside is the complexity of insurance rules. There are number of policies that require referrals, rather than going straight to the specialist. Certain drugs are not covered by the insurance, and it may not pay for certain elective procedures that are not elective according to the patient or the doctor.
- ✚ **Lack of Choice** : A drawback of health insurance is the lack of choice. In certain policies, patients do not have the option of choosing their doctors or hospitals, while in others, they do.

HEALTH MAINTENANCE ORGANISATIONS (HMOS)

- HMOs are a type of managed care health insurance plan, including a network of healthcare providers who treat a patient population for a prepaid fee.
- HMOs integrate financing and care delivery as prepaid health plans.
- providing an incentive to provide cost-effective, high quality treatment.
- The goal to harmonise financial and care-quality incentives drove the development of HMOs. Such alliance. of incentives contrasts with alternative health care payment structures (fee-for-service designs), where healthcare providers may have a financial incentive to do so inefficiently.

Structure of HMOS

- An HMO is anticipated to provide comprehensive healthcare services. The Health Maintenance Organisation Act. 1973 specifies the following minimum benefit services that an HMO must provide:
 - Physician services (consultant and referral services provided by a physician).
 - Hospital services for in-patients,
 - Emergency health services. that are medically necessary.
 - Medical treatment and referral services for alcohol and drug abuse and addiction
 - Diagnostic and therapeutic radiological services, as well as diagnostic laboratories.
 - Health-care services at home.
 - Preventive health services.

Functions

- ❖ To collect contributions from employers and employees around the country.
- ❖ To register employer and employees.
- ❖ To register service providers after ensuring that they meet the minimum NHIS requirements.
- ❖ To promote and educate about health.
- ❖ To establish efficient quality assurance procedures.
- ❖ To ensure that contributions receive high-quality and cost-effective healthcare through healthcare providers.
- ❖ To ensure that donations are kept in the certified banks of the scheme.
- ❖ To make certain that claims are processed efficiently.
- ❖ To collect the requisite contributions and make timely payments to the appropriate pools.
- ❖ To market in accordance with NHIS regulations.

Advantages

- ✓ HMOs have huge networks of doctors including specialists, in almost every section of the country.
- ✓ The number of primary care visits has no limits.
- ✓ Drug prices are kept low (needing only a small co-payment), and generic as well as brand-name medications are offered.

- ✓ In most cases, patients are not required to file insurance claims.
- ✓ If a claim is refused, HMOs provide an appeal process.

Disadvantages

- ✚ Patients will only be covered by their insurance if they visit an in-network doctor and facility.
- ✚ Patients will need to switch doctor if their primary care provider leaves the network.
- ✚ Unless it is an emergency, patients must acquire a referral from their primary care physician, before seeing a specialist.

HEALTH SPENDING

- Health spending includes both medical and non-medical expenses.
- All expenditures or outlays for medical care, prevention, promotion, rehabilitation, community health activities, health administration and regulation, and capital development with the primary goal of improving health are included in health expenditure)
- Expenses on health-related functions (such as medical education and training, as well as research and development) are included in health-related expenditures."

Classification

Health spending is categorised as follows :

- Hospital care
- Physician services
- Clinical services
- Prescription drugs
- Nursing care facilities
- Home health care
- Other personal health care costs

OUT-OF-POCKET EXPENSES

- Employee's out-of-pocket expenses are those costs that must be paid in cash.
- Employees are usually reimbursed for these expenses via an expense reporting and check payment mechanism.

Examples of Out-of-Pocket Costs

- Purchasing gasoline, parking, and tolls while on corporate business.
- The expense of a client's business lunch.
- The price of an employee's incentive card.

Advantages

- ✓ Out-of-pocket expenses can be claimed as tax deductions for charity contributions, unreimbursed medical bills, and so on. It may be able to assist in the reduction of tax burdens.
- ✓ Out-of-pocket expenditures, such as cigarette taxes, are used to alter the nature of consumers' smoking behaviour, which has detrimental health consequences.
- ✓ It creates a sharing component between two parties by requiring both the parties to contribute to a cost.

Disadvantages

- ✚ The requisite cash must be brought up-front; and there may be a cash shortage at times, resulting in the transaction failing.
- ✚ Even while the medical insurance company pledges to pay all health-related costs, there is a catch where the 100% cost will never being covered once the idea of out-of-pocket spending goes into effect.
- ✚ Out-of-pocket expenditures are unpredictable, and at times, might disrupt the individual's planning and budget.

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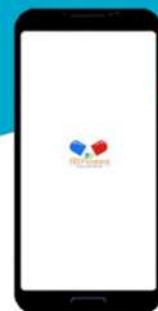
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