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Chapter 2 : Preventive Healthcare

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Chapter 2

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 involves 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'sc called ovulation The egg moves through the fallopian tube towards the uterus An unfertilised egg can live up to 24 hours
- Fertility happen 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 by 0.3-0.5 c
- This is because the production of progesterone at this time increase 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 become watery clear like the raw egg white, smooth, slipper, After ovulation it becomes thick and also its quantity decrease

3. Chemical method

- Chemical method utilise chemical contraceptive in which a base with incorporated spermicide is present
- Surface active agents are the commonly used spermicide there 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 tabletsare inserted by the woman into her vagina before the intercourse The tablets produce foam after insertion this form forms a protective coating to the whole area kills the sperms released in the vagina during intercourse and thus prevent pregnancy

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

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

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 interfears 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 medicates 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 form 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 with in 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 block by applying falope rings or clips
- Laparoscopy provide permanent protection against unwanted pregnancy
- No side effects

7. Post conceptional method

- Levonoorgestrel either alone or combination with estrogen should be taken orally with in 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 with in 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 woman experience nausea and Vomiting.

Levonorgestrel 0.75 mg : taken twice with in 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 delay the next period.

Mifepristone 600 mg : taken once with 72 hours of unprotected intercourse has a high rate of success and almost negligible side effects This method has now a days become prevalent through out 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 mobidity 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 reliabilation 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 Material 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 childrens<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 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 about5-7 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 themother's diet, immunity, environment, and lifestyle. These bacteria, on passing from the mothers to their babies, help them in developing their intestinal microbioal to fight off infections.

➔ **Antibodies or Immunoglobulins:** These are found 3 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 diabetesin 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

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

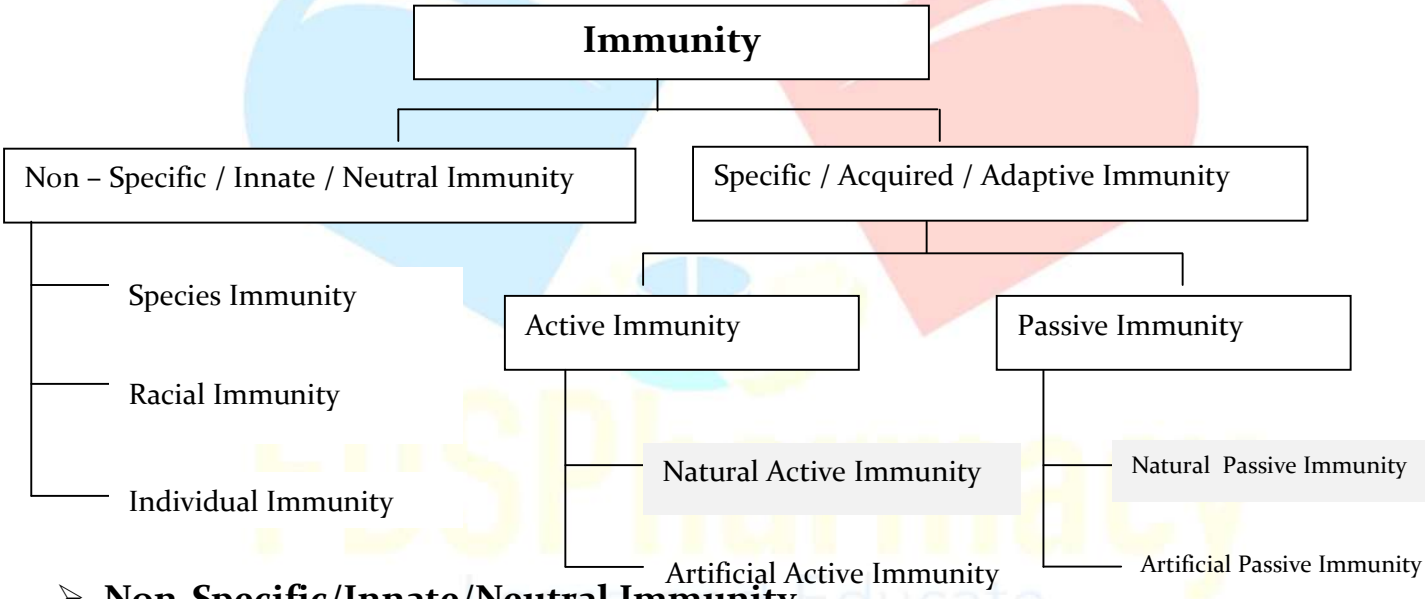
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IMMUNITY

- 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**
  - Thís 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 typeof imnmunity 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 immmune 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 weekend so that it does not contain serious diseases in people with healthy immune system

Eg : Varicella(chiken pox)

Toxoids

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

Cellular Fractions

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

These vaccines have linited 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.

Immunologlobulins

- 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
		Typhoid	1
Pregnant Women	16 – 36 weeks of	TT	1

	pregnancy		

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

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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

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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 bodie

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 method 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 mproving Skin Health :** Hydration boosts skin health and beauty Skin can become more prone to skin disorders ánd 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 NO2 is reddish brown gas with suffocating odour

Causes of Air Pollution

- Anthropogenie 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

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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 polution.

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

Effects of Noise Pollution

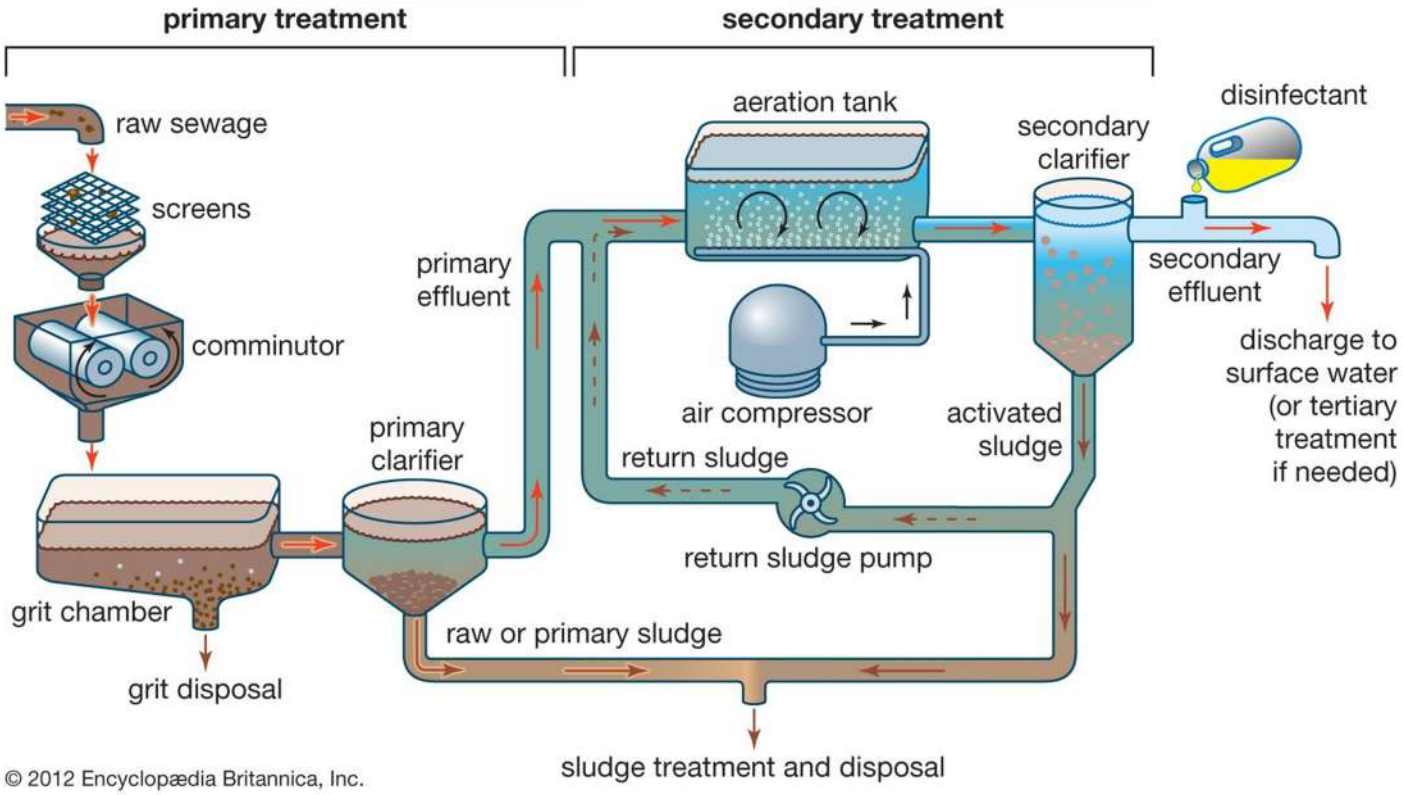
- **Deafness:** Hearing loss may be either temporary or pemanent. Temporary hearing loss occurs when exposed to 4000-6000Hz and it disappears in a day; while permanent hearing loss occurs on repeated or continuous exposure to noise Around 100dB which generally damages the inner ear.
- **Non-Auditory 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 ontinuous 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 t 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 contans only O.4% solid waste particles and pollutants which are biodegradable and rest 99.6% (approx.) is wate
- It is required by the larger industrial and commercial consumers to treat their sewage water or trade waste, before releasing it Lo 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 that 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 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 camps, 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 managemen
- 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 colicction 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