

- (7) For successful action plans to attain reproductive health requires good infrastructural facilities, professional expert knowledge and material support. These are necessary to provide medical help and care for reproduction related problems like menstrual problems, infertility, pregnancy, delivery, contraception, abortions, sexually transmitted diseases (STDs)
- (8) Amniocentesis is foetal sex determination and disorder test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo
- (9) Research should be encouraged and supported to find out new methods of birth control “ Sheli” a new oral contraceptive for the females was developed by our scientists at Central Drug Research Institute (CDRI) in Lucknow. India
- (10) Better awareness about sex related problems, parental care of mother, medically assisted deliveries and post natal care of infant decreases maternal and infant mortality. Smaller families, better detection and cure of sexually transmitted disease and increased medical facilities for sex-related problems etc. indicated improved reproductive health of male and female individuals and children.

POPULATION EXPLOSION

The rapid increase in population over a relatively short period is called population explosion.

Reasons for population explosion

- Increase in longevity due to decline in death rate, maternal mortality rate (MMR) and infant mortality rate.
- Control of diseases has reduced the death rate and increased the average human age.
- Better sanitation.
- Proper care of new born children and their mother.
- Better nutrition and life amenities.

- Better public health care, improvement in medical facilities and grater medical attention are playing crucial role in decreasing death rate and increasing birth rate.
- Advancement in agriculture, improvement in food storage conditions and better means of transport are causing rapid increase of human population.
- Protection from natural calamities has decreased death rate.
- Certain religions are against family planning.
- Lack of education in developing countries.
- Early marriage, child labour.
- Desire of male child.

Consequences of over population

Over population leads to number of not only national but also individual family problems. Some of these are described below

- (1) It increases poverty in the family as well as in the country.
- (2) If the production of food does not increase it will lead to shortage of food supply.
- (3) Rapid increase in population leads to unemployment and educational facilities.
- (4) It is very difficult to provide house for everyone in case of rapid increase in population.
- (5) Over population causes eco-degradation in more than one way such as rise in pollution, unhygienic condition and deforestation etc.
- (6) Over population leads to shortage of essential goods there by resulting hike in their prices.
- (7) Increase in population has created energy crisis. The demand of fuel wood, oil, gas coal and electricity is increasing.

Measures to control population

- (1) Reduction in birth rate is the only practicable and direct method to control the population. It can be done in various ways.
- (2) People particularly those in the reproductive age group, should be educated about the advantage of small family.

- (3) Posters showing a happy couple with two children with slogan “ Hum do Hamare Do” should be displayed.
- (4) At present marriageable age is 18 years for girls and 21 years for boys. By increasing the age of marriageable population, growth can be checked.
- (5) Couple with small families can be encouraged by giving incentives.
- (6) There are many birth control measures which can check birth rate such as use of contraceptives.

BIRTH CONTROL (CONTRACEPTION)

The regulation of conception by preventive method or devices to limit the number of offsprings is called birth control or contraception.

Birth control methods act by blocking one of the three major steps in the reproductive process.

- (1) Blocking sperms transport to the ovum.
- (2) Blocking ovulation.
- (3) Blocking implantation of early embryo.

Methods of birth control

The various birth control methods can be grouped into following three steps.

- (1) Temporary method.
- (2) Permanent method.
- (3) Medical termination of pregnancy.

I) Temporary method

These are of many types

(i) Natural methods.

Safe period or periodic abstinence

Week before and week after menses is considered the safe period for sexual intercourse. This is because

- (a) Ovulation occurs on about the 14th day of menstruation.
 - (b) Ovum survives for 1-2 days.
 - (c) Sperms remains alive about three days.
- These method may reduce the chances of pregnancy by about 80%

- Safe period or rhythm method is called natural family planning because it requires temporary abstinence from sexual intercourse when conception is most likely.
- Changes in cervical mucus and body temperature during the menstrual cycle are physiological changes which marks ovulation time.
- The effectiveness of this method is limited because only a few women have regular menstrual cycles and actual time of ovulation can not be predicted as the ovulation in humans occurs about 14 days before onset of the next menstruation.

Coitus interruptus or withdrawal method

- It involves withdrawal of the penis from the vagina by the male just before ejaculation so that semen is not deposited in the vagina and there is no fertilization.
- This method is only moderately effective because male produces some lubricating fluid from his Cowper's glands before ejaculation that contains many sperms.

Lactational amenorrhoea method (absence of menstruation)

- It is based on the fact that ovulation and therefore the menstrual cycle do not occur during the period of intense lactation following child birth (parturition).
- This method is considered effective only up to a maximum period of six months following parturition.

(ii) Barrier method

These are mechanical devices which prevent deposition of sperms into vagina and their passage to uterus. The common barrier methods are condoms, diaphragm, fem shield and cervical cap.

- Condom
It is tubular latex sheath which is rolled over the male copulatory organ during sex. The common brand provided by family welfare

services is "Nirodh". The device also provides protection against sexually transmitted disease. It should be discarded after single use.

- Fem shield (Female condom)

The device is polyurethane pouch with ring at either end. The inner ring is smaller and present at the inner closed end. The device covers the external genitalia as well as lines the vagina. Fem shield provides protection from sexually transmitted diseases.

- Diaphragms

It is soft rubber cap with flexible metal or spring ring at the margin which is fitted inside the vagina. It prevents sperm from reaching egg and gives protection against cervical cancer .

- Cervical caps

It is a miniature diaphragm that covers cervix closely. It is fairly effective and can remain in place longer than diaphragm.

- Vault cap

It is hemispherical dome like rubber or plastic cap with a thick rim which is meant for fitting over the vaginal vault over the cervix.

(iii) Chemical method

Foam tablets, creams, jellies and paste are inserted in the vagina before intercourse to prevent sperms from entering the uterus. These contain spermicides such as lactic acid, citric acid, boric acid.

Zinc sulphate and potassium permanganate which kills sperm.

Sponge (Today) is a foam suppository or tablet containing nonoxynol-9 as spermicide. It is moistened before use to activate the spermicide.

(iv) Intra uterine devices (IUDS)

- Intra uterine devices (IUDS) are plastic or metal objects which are inserted by doctors in the uterus through vagina.

- These are available as non-medicated IUDS (i.e. Lippes loop) copper releasing (CuT, Cu7 , Multiload 375) and hormone releasing IUDS (progestasert, LNG-20)

- IUDS increases phagocytosis of sperms within the uterus and the Cu ions released by copper releasing IUDS suppress sperm motility and fertilizing capacity of sperms.

- Copper IUDs commonly called copper T have ionized copper which slowly diffuses at the rate of some 50 $\mu\text{g}/\text{day}$. It has a local anti-fertility effect by bringing about release of toxic cytokines. The device is to be replaced after 3-5 years when copper release becomes scanty due to calcium deposition. CuT380A has a replacement period of 7-10 years copper IUDs are designed by the area of sq mm having copper
- The hormone releasing IUDs make the uterus instable for implantation and the cervix hostile to the sperms.
- Hormone releasing IUDs include progesterone IUD and levonorgestrel IUD. The device release small quantity of hormones which suppress endometrial changes and cervical mucus, cause anovulation and insufficient luteal activity.
- There are certain disadvantages of the intra-uterine devices. These are
 - (a) IUDs are expelled without the knowledge of the wearers in about 10 to 15% of the women and they run the risk of becoming pregnant.
 - (b) Risk of perforation and also risk of infection occurs.
 - (c) They can cause menstrual bleeding and pain.
- (v) Oral contraceptives
 - Oral contraceptive are physiological contraceptive devices.
 - These are used in the form of tablets, therefore, they are called pills.
 - Pills have to be taken for 21days starting with the first five days of menstrual cycle. After a gap of seven days it has to be repeated.
 - Pills are very effective with lesser side effects.
 - Hormonal pills act in following four ways
 - (a) By inhibiting the ovulation.
 - (b) By inhibiting the motility and secretory activity of oviducts.
 - (c) By changing the cervical mucus and impairing its ability to allow passage and transport of sperms
 - (d) By alternation in uterine endo-metrium to make it unsuitable for implantation
 - Oral contraceptive pills contain progesterone alone or a combination of progesterone and estrogen
 - These are of two types: Combined pills and mini pills

- Combined pills are most commonly used contraceptive pills which contain synthetic progesterone and estrogen synthetic progesterone and estrogen to check ovulation. Mini pills contain progestin only
 - Pills “Mala D” and “Mala N” are commonly used combined contraceptive pill. These are taken daily with out break.
 - Saheli, a new oral contraceptive pill for female has been developed at Central Drug Research Institute (CDRI), Lucknow.
 - It contains a non-steroidal preparation called centchroman which is taken once in a week dose for three month.
 - It has very high contraceptive value with very little side effects.
 - Oral contraceptive pills increases the risk of intravascular clotting. Therefore they are not recommended for women with history of disorder of blood clotting, cerebral, blood vessel damage, hypertension, heart diseases etc.
- (vi) Subcutaneous implants (Norplant) . A new contraception is a subcutaneous (under the skin) implantation of synthetic progesterone. It acts similarly to oral contraceptives by blocking ovulation and thickening the cervical mucus. Six matchstick sized capsules containing the steroid are inserted under the skin of the inner arm below the elbow. The capsules slowly release the synthetic progesterone for about five years.
- (vii) Hormone injection (Depo-Prova)
- These are progesterone derivative injections which is given once every three months, that releases a hormone slowly and prevents ovulation.
 - Depo medroxy progesterone acetate (DMPA) and Norethisterone enantate (NET-EN); are two injectable hormonal contraceptives
 - They are convenient and highly effective with no serious side effects. There is occasional heavy menstrual bleeding.
- (viii) Emergency pills (morning after pills)
- Implantation can also be checked by so called morning after pills, also called morning after pills, also known as emergency contraceptive.
 - The most common form of emergency contraceptive is a kit consisting of high dose of birth control pills. The kits can prevent pregnancy within 72 hours after unprotected sexual intercourse.

II) Permanent method

- Sterilization provides a permanent and sure birth control.
- Sterilization in male is called vasectomy and in female it is called tubectomy.

(1) Vasectomy (L.vas-vessel, ektome-excision)

- It is a surgical method of sterilization of males. Vas deferentia are blocked by cutting and occluding them so that sperms are unable to pass down the male reproductive system.

(a) Conventional vasectomy (scalpel surgery) under local anesthesia, transverse 1cm incision is made through the skin of the scrotum with the help of the scalpel over the area of casa deferentia. Each vas is exposed and cut. The two ends are separated and tied. A gap of 1-4 cm is must between the ends otherwise reunion can occur.

(b) No- scalpel vasectomy. Here instead of scalpel, a dissecting forceps and a ringed forceps are required. The skin is punctured and the vas is taken out. It is occluded by removal of 1-2cm followed by removal of 1-2cm followed by ligation of ends. Occlusion can also be achieved by heat and clips. Vasectomy is a reversible procedure as the cut ends can be joined together to open the sperm passage.

(2) Tubectomy (L-tubus – pipe, ektome-excision)

- It is a surgical procedure of female sterilization where a portion of both the fallopian tubes is excised or ligated to block the passage of ovum through them. Tubectomy is performed by conventional trans-abdominal surgery, conventional lap-rotomy and milaparotomy.
- In surgical procedures, the fallopian tubes are cut and the cut ends tied to prevent reunion. The procedure is reversible as the cut ends can be rejoined. In laparoscopic procedure, sterilization is achieved by loop development and constricting the basal region of loop with the help of silistic ring.

(3) Essure

It is a near permanent contraception in women who do not want to bear another child. Tow tiny metal coils are inserted in the two fallopian tubes through vagina and uterus by an instrument called hysteroscope. Within 3 months the tissue around coils grows blocking the fallopian tubes permanently.

[DIAGRAM]

MEDICAL TERMINATION OF PREGNANCY (MTP) OR INDUCED ABORTION

- Intentional or voluntary termination of pregnancy before the foetus becomes viable is called medical termination of pregnancy or induced abortion.
- It is one of the most widely used methods of fertility control in the world.
- MTP is comparatively safe up to 12 weeks (1st trimester) of pregnancy. It becomes risky after the first trimester as the foetus becomes intimately associated with maternal tissue.
- During 1st trimester of pregnancy misoprostol (a prostaglandin) along with mifepristone (antiprogesterone) is an effective combination.
- In india, there is medical Termination of pregnancy 1971. Which mainly meant for preventing unnatural maternal death due to unsafe abortions. Under this act, termination of pregnancy can be done up to 20 weeks, if pregnancy is likely to produce a congenitally malformed child, is a result of rape and contraceptive failure or is likely to harm the mother.
- Second semester abortions are risky. They are generally performed after testing the sex of the baby through amniocentesis or sonography.
- It has resulted large scale female foeticide and complications due to unsafe abortions in the hands of untrained persons. To prevent such happening, the government has enacted a law Pre-natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 with amendments in 2003. It inhibits preconception and prenatal sex determination, contravention of this act is punishable with an imprisonment of 5 years and fine of Rs 1,00,000 along with cancellation of medical registration and license.

SEXUALLY TRANSMITTED DISEASES (STDs)

Diseases or infections which are transmitted through sexual intercourse with infected person are collectively sexually transmitted diseases (STDs) or venereal diseases (VD) or reproductive tract infection (RTID).

Except HIV infection, hepatitis-B and genital herpes all other STDs are completely curable if treated early and treated properly.

Symptoms of STDs

- The initial symptoms of most of the sexually transmitted diseases are minor. These include itching, burning after urination and ejaculation, fluid discharge, mild pain and swellings etc. in genital region. Infected females may often be asymptomatic and hence, may remain undetected for long.
- In women, the most commonly infected part of the body is the lower genital tract (vulva, vagina or urethra) and in men, the most commonly infected body part is the inside of the penis. The discharge from penis of gonorrhoea infected person is yellow, white or green in colour.

Common STDs

(1) Syphilis

- Syphilis is caused by bacterium *Treponema pallidum*.
- The first stage symptoms of this disease are painless ulcer or chancre on genitals and swelling of local lymph glands.
- In the second stage, chancre is healed and there are skin lesions rashes, hair loss, swollen joints and flu-like illness occasionally.
- In the tertiary stage chronic ulcers appears on palate, nose and lower leg. There can be paralysis, brain damage, blindness, heart trouble and aortic impairment.
- It is transmitted through sexual contact and from mother to children
- Incubation period is 10-90 days.
- It is diagnosed by clinical symptoms, microscopic examination and antibody.
- It can be cured by appropriate antibiotics. E.g. penicillin, tetracycline

(2) Gonorrhoea

- Gonorrhoea is caused by bacterium *Neisseria gonorrhoeae*.
- Bacterium lives in genital tubes, produces pus containing discharge, pain around genitalia and burning sensation during urination. It may lead to arthritis and eye infection in children in gonorrhoea affected mothers.
- It is spread through sexual contact, common toilets and under clothes.
- Its incubation period is 2-5 days.
- It is diagnosed by clinical symptoms and gram staining of discharge and culture.
- It can be cured by the use of antibiotics such as penicillin and ampicillin.

(3) Chancroid

- Chancroid is caused by bacterium *Haemophilus ducreyi*.
- Appearance of ulcer at the site of infection generally over external genitalia and swelling of nearby lymph glands are common symptoms of the disease.
- It is spread through sexual contact.
- It is diagnosed by clinical symptoms, staining of discharge and cell culture.
- Effective antibiotics for the treatment are ceftriaxone, erythromycin, ciprofloxacin and trimethoprim sulphamethoxazole.

(4) AIDS

- AIDS is caused by human immunodeficiency virus (HIV).
- The symptoms of AIDS include fever, lethargy, pharyngitis, weight loss, nausea, headache, rashes etc.
- Because HIV attacks helper T lymphocytes, the patient gets immune deficiency and he is unable to protect himself against infections.
- HIV is transmitted via semen and blood.
- Its incubation period is 6 month to 10 years.
- AIDS can be diagnosed by ELISA test western blotting is used for conformation of ELISA positive cases. PCR is also used to diagnose AIDS.

- Although there is not any permanent cure of AIDS yet certain anti-retroviral drugs such as zidovudine and didanosine are being employed to prolong the life of AIDS patient.

(5) Hepatitis B

- Hepatitis B is caused by hepatitis B virus (HBV).
- Its symptoms include fatigue, jaundice, persistent low grade fever rash and abdominal pain. It can cause cirrhosis and possibly liver cancer.
- It is most infectious diseases. Mode of transmission may be blood transfusion, sexual contact, saliva, tears, intravenous drug abuse, tattooing, ear and nose piercing, sharing of razors etc
- Incubation period is 30-80 days.
- It can be diagnosed by Australian antigen test which is now called hepatitis-B surface antigen (HBS Ag). It can also be diagnosed by ELISA.
- Complete rest is suggested by physician in cause of hepatitis B interferon is used for treatment vaccines have been produced by r-DNA technology to prevent hepatitis-B.
- Hepatitis C and hepatitis D are also considered as sexually transmitted disease.

(6) Genital herpes

- Genital herpes is caused by simple herpes virus
- Vesiculopustular lesions followed by clusters of painful erythenatous ulcer over external genitalia and perennial region, vaginal and urethral discharge and swelling of lymph nodes are some common symptoms of the disease
- The disease is primarily transmitted through genital secretions but also contact viroids and genitalia.
- It is diagnosed by antigen detection PCR and nucleic acid hybridization.
- Treatment consists of acyclovir, valacyclovir and fancyclovir.

(7) Genital warts

- Genital warts is caused by human papillona virus.

- Symptoms include benign, hard outgrowths with horny surface (warts) over the skin and mucosal surface of external genitalia and perianal area.
- It spreads through sexual intercourse with carriers of the viruses of this disease.
- Diagnosis is done by clinical symptoms, antibody detection, culture and DNA hybridization.
- Cryosurgery is used in removal of warts. Podophyllum preparations and podofilox are useful in treatment. Imiquimod and interferon inducer is also useful.

(8) Chlamydia

- Chlamydia is caused by *Chlamydia trachomatis*.
- Chlamydia causes urethritis, epididymitis, mucopurulent cervicitis, inflammation of fallopian tube, proctitis, rectal pain with mucus and occasional bleeding etc.
- It spreads by sexual contact with infected mating partner.
- Incubation period is about one week.
- It is diagnosed by Gram-staining of discharge, antigen detection and nucleic acid hybridization.
- Antibiotics like tetracycline, erythromycin and rifampicin are effective in treatment.

(9) Lymphogranuloma venereum

- Lymphogranuloma venereum is caused by chlamydia trachomatis of L₁, L₂, L₃ serotypes.
- Symptoms include cutaneous or mucosal genital lesion, urethritis or endocervicitis and genital elephantiasis.
- It is diagnosed by Gram negative discharge, antigen detection, microscopic examination of scraping and nucleic acid hybridization.
- It spreads by sexual contact.
- Antibiotics tetracycline, doxycycline, erythromycin and azithromycin are used for treatment.

(10) Trichomoniasis

- Trichomoniasis is caused by *Trichomonas vaginalis*
- The parasite affects both males and females.

- In females it causes vaginitis with foul smelling, yellow vaginal discharge and burning sensation. In males, it causes urethritis, epididymitis and prostatitis resulting in pain and burning sensations.
- It is transmitted through sexual intercourse.
- It is diagnosed by microscopic examination, culture and immunofluorescent antibody staining.
- It can be treated by metronidazole.

(11) Scabies

- Scabies is caused by *Sarcoptes scabiei*.
- Its symptoms include painful itching and red patches on the skin of pubic region.
- The parasite is transmitted by intimate contact or by sharing cloth, sheets and blankets etc.

(12) Pediculosis pubis

- Pediculosis pubis is caused by *Phthirus pubis* (*Parasitic louse*).
- Its symptoms include painful itching and red patches on the skin of pubic region.
- The parasite is transmitted by intimate contact or by sharing clothes, sheets and blankets etc.
- Medical shampoos are recommended for treatment.

(13) Candidiasis

- Candidiasis is caused by fungus *Candida albicans* (*Vaginal yeast*).
- Women with yeast infections experience painful inflammation of vagina often with a thick cheesy discharge.
- Man may develop a painful inflammation of the urethra through sexual contact with an infected woman.
- Antibiotics such as clotrimazole, miconazole and nystatin are used for the treatment.

INFERTILITY

- Inability to conceive or produce children inspite of unprotected sexual cohabitation is called infertility.
- It is caused by various reasons which can be grouped under Physical, Congenital, immunological or even psychological disorders.

- Specialized infertility clinics can help in the diagnosis and proper treatment of some of these disorders and enable these couples to have children.
- However, where such diagnosis and treatment are not possible, the couples can be assisted to have children through certain special techniques called assisted reproductive techniques (ART)

Assisted Reproductive Technologies (ART)

Assisted reproductive technologies(ART) include a number of special techniques which assist infertile couples to have children.

Some important are

- (1) Test tube baby programme
 - (2) Artificial insemination technique
 - (3) Gamete intra fallopian transfer
 - (4) Intracytoplasmic sperm injection
- I) Test tube baby programme
- The baby produced by conceiving in a culture dish and nursing in the uterus is called a test tube baby.
 - This method involves in vitro fertilization (IVF) i.e. fertilization of male and female gametes outside the body in almost similar conditions as that in the body followed by Embryo Transfer (ET).
 - Embryo upto 8 Blastomeres is transferred into the fallopian tube (ZIFT – zygote Intra Fallopian Transfer) to complete its further development.
 - If the embryo is with more than 8 blastomers, it is transferred into uterus (IUT – Intra Uteriane Transfer) to complete its further development.
 - A developing embryo can be inserted in the uterus of another female. A woman who substitutes or takes the place of the real mother to nurse the embryo is called surrogate mother or genetic mother
 - The success rate of the technique of producing test tube babies is less than 20%. In India, the first test tube baby was born on August 6, 1986 at K.E.M Hospital, Mumbai. She was named kum. Harsha. The doctor was Indira Hinduja

(II) Artificial Insemination Technique (AIT)

- AIT is used in those females where the husband is either unable to inseminate the female or has very low sperm counts in the ejaculation.
- In this technique the semen collected either from the husband or a healthy donor is artificially introduced into the vagina or into the uterus of the female.

(III) Gamete Intra Fallopian Transfer (GIFT)

- This method is used in females who cannot produce ova but can provide suitable environment for fertilization and further development of embryo in the oviducts
- In this technique, ovum from the donor female is surgically removed and then introduced into the fallopian tube of females incapable of producing ovum for fertilization

(IV) Intra Cytoplasmic Sperm Injection (ICSI)

- In this technique sperm is directly injected into the ovum to form an embryo in the laboratory
- The embryo is later transferred by ZIFT or IUT in woman

DETECTION OF FOETAL DISORDERS DURING EARLY PREGNANCY

Foetal disorders during early pregnancy can be detected by following techniques

- Amniocentesis
- Chorionic Villi Sampling (CVS)
- Non-invasive techniques
- Foetoscopy

(I) Amniocentesis

- Amniocentesis is a foetal sex determination and disorder test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo

- Then a small amount of amniotic fluid is drawn by passing special surgical syringe needle in to the abdominal wall and uterine wall into the amniotic sac containing amniotic fluid.
- These cells are cultured and are used to determine chromosomal abnormalities.
- Unfortunately, this useful technique is being misused to kill the normal female foetuses. It has been legally banned for the determination of sex to avoid female foeticide.

(II) Chorionic Villi Sampling (CVS)

- In this technique the physician inserts a narrow, flexible tube through the mother's vagina and cervix into the uterus and withdraws a small amount of foetal tissue from the placenta.
- It is advantageous over amniocentesis in its speed and also that it can be performed early, between 8th and 10th week of pregnancy.

(III) Non-invasive technique

- One of the widely used non-invasive technique to determine foetal condition is ultra sound imaging.
- Another technique is based on the fact that a few foetal blood cells leak across the placenta into the mother's blood stream. A blood sample from the mother provides enough foetal cells that can be tested for genetic disorders.

(IV) Foetoscopy

Foetoscopy is another technique in which a needle-thin tube containing a viewing scope is inserted into the uterus, giving the physician a direct view of the foetus.