DEMOGRAPHY

Scientific study of human population is called "Demography". (Demo= people, graphos= to write)

Population – population is defined as the total number of individuals of a species present in a particular area at a given time (A species have many population living in different regions)

CENSUS :

Official counting of individuals in first 4 month of 1st year of each decade is called census.

Population of world :

2000	-	6.1 billion
3,36,960	-	child born per day
1,46,960	-	person dies per day, so there is increase in population 1,90,000 per day.

Max. Population : china 1997 - 1244 million

Switzerland - 8.8 lack

Population of India:

Ist counting	-	1872
Ist Census in India	-	1891
Census	-	2001(12^{th} Cnsus (1891), 13^{th} counting(1872))
Population	-	1.02 Billion (53% -males, 47% - females)
	-	17% of world population

India completes 17% of total world population.

It is on 2^{nd} place in world population.

Every 6^{th} person in world is an India.

In land area, India covers only 2.4% of land area.

India lies on 7^{th} place in land area.

World population day : **11 July. (Every year from 1987)**

On this day 5^{th} Billion child of world population was born.

1. Population Density (P.D.):

No. of person living in per square km. area

P.D. = =

World -33/km^2

Maximum (Most thicky population)	-	Bangladesh (Previously Japan)
Minimum	-	Green Land – 15/km^2 (Previously Australia)

India -324 person /km^2 (2001)

2. Birth rate:

Birth Rate =

Crude Birth Rate (C.B.R.) – Birth rate at per thousand population is called as **crude birth rate.**

C.B.R. – India - 24 birth/1000/yr.

Maixmum - State : U.P. -35 (1991)
Rajasthan -31 (2001)

Minimum - State : Kerla -18

3. Death Rate:

Death Rate =

Crude Death Rate (C.D.R.) – Death rate at per thousand population is called as **crude death rate.**

CDR =

India C.D.R. – 8 death/1000/yr.

4. Population Growth :

Human population growth rate is measured as the annual growth rate which can be calculated as follows:

Annual Growth Rate:

CBR – CDR =24 -8 = 16 person/1000/yr.

Percent Annual Growth rate =

If percent annual growth rate of a country is 25 then population will double itself after 33 yrs. (doubling time)

Growth Rate:

Developed - 0.8%

Developing -2.5 %

Swedon – 0 %

India Growth Rate:

(1) 1965-70 - 2.1%

(2) Now - 1.6% (1.75 according to 2001 census)

1921 is known as **big divide year of Indian population.** Before 1921 in (1911-1920)

CBR = 49.9 & CDR – 47.9 so % AGR = 0.2% 0%

But after 1921 population increase a very fast rate.

Population Growth:

Positive Growth - Natality + Immigration

Negative growth - Mortality + Emigration

Zero Growth - (Natality+ Immigration) = (Mortality + Emigration)

5. Infant Mortality Rate (I.M.R.) :

Infant – Children upto one year after birth

Neonates - upto 28 days after birth (or one month)

Perinates - Child less then one week.

I.M.R. = $\frac{No.of\ death}{Tot}$

(Dead born or still born child are not counted)

India : - 58 (Now)

- 67 (2001)
- 72(1991)

Maximum	-	M.P.	-	89 (1991)
		Rajasthan	-	85 (2001)
Minimum	-	Kerala	-	15

World :

Maximum	-	Bangladesh	-	100
Minimum	-	Japan	-	4 (developed countries < 10)
		U.S.A.	-	8

I.M.R. reflect the socio-economic development of country

It is a most senitive index of health & living of people.

6. Maternal Mortality Rate (MMR) :

$$\frac{No.of\ death\ of\ females\ due\ to\ deliver}{Total\ Pregnency}$$

India	-	3 Female/1000/yr.
Developed country	-	Japan -0.1 female/1000/year

7. Sex Ratio:

Number of Females / 1000 males

India	-	933 : 1000 (2001)
Maximum	-	State: Kerala (1058/1000), U.T. : Pondichery (1001/1000)
Minimum	-	State: Haryana (861/1000) U.T.: Daman & Diu (709/1000)
World	-	Sex ratio – 1:1

8. Literarcy:

A person can read and write with understanding in any language is called literate.

India	-	65.38(2001)
		52.2 (1991)
Maximum	-	Kerla (90.92%)
Minimum	-	Bihar (47.53%)

Growth rate depends on following factors -

1. Birth rate or Biotic potential or Fertility or Natality:

Biotic potential is **maximum natality** or **birth rate** that can be achieved under ideal condition of environment (GR may be Negative but B.R. never be Negative)

It is the ability of reproductively active individuals to produce babies fertility is the determinant of the current growth of population.

Fertility rate varies from region to region. The more developed countries have lower fertility rate (close toreplacemnt level) than the developing.

Fertility is largely controlled by economics high fertility in developing world is partially explained by large number of hand needed to perform low. Technology task as the technology improves parents realize that having more children lead to lower standards of living this realistion leads to a lower fertility rate.

2. Mortality or Death Rate :

In most countries, the death rate has dropped almost continuously since the industrial revolution, mainly due to improved health services. A decrease in death rate would result in increase population growth rate.

3. Migration :

Migration is the movement of Individuals into (immigration) or out of (emigration) a place or country. Immigration minus the emigration is called Net immigration. Which is added to the population growth by birth (Natality).

PGR = (Natality + Immigration) – (Mortality + Emmigration)

4. Age and Sex Structures :

The age structure of a given population refers to the proportion of individuals of different age. This is important aspect because many functional aspect of individuals are releted to age. (Like Reproduction) Age structure of a population can be depicted in the form of a pyramid diagram.

- Developed countries have a steeper pyramid which represent a nearly stable population.
- Developing countries (like India) represented by a much less stepper pyramid.
- Infants (below one year of age) and older people have higher mortality rate than individuals of other ages.
- The population of reproductive active males and females in a population influence the birth rate and population growth.

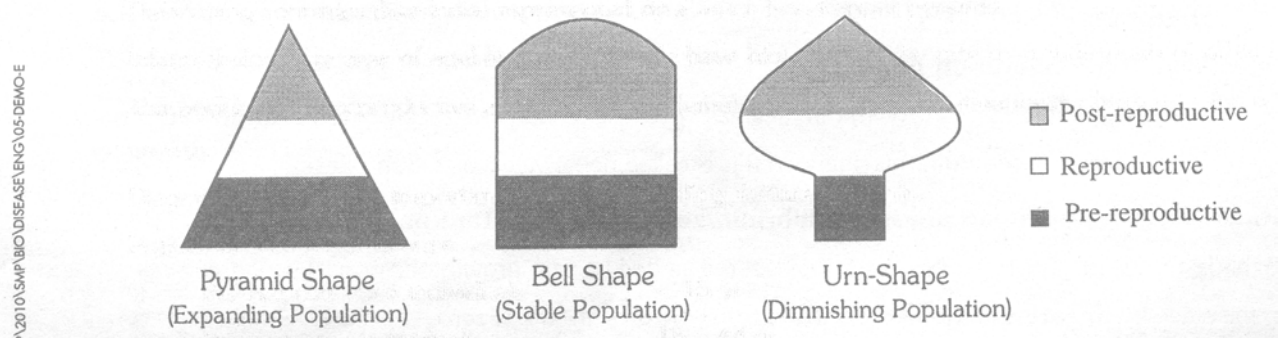
Diagram is particularly important in **understanding future growth.**

Population has 3 age groups.

(i) Pre-Reproductive individuals - < 15 yr

(ii) Reproductive individuals - 15 – 44yr

(iii) Post- Reproductive individuals - > 45 yr

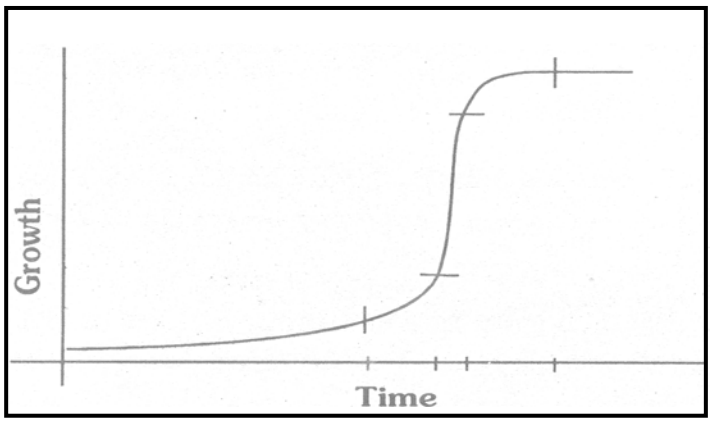


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- **A higher number of pre-reproductive** individuals, moderate number of reproductive individuals and fewer post reproductive individuals will form young population it shows rapid growth.
- **Fewer number of pre reproductive** individuals as compared to reproductive ones will make population aged. It shows **negative growth.**
- An **equal number** of pre reproductive and post reproductive individuals will constitute a mature population or **stable population.**

Population Growth Curve :

For human population growth curve is S- shaped/ sigmoid shaped in which 5 stages are present.



1. Lag Phase:

In the earlier stages of growth curve a species (Human population & Macro Organism) comes into the new environment so due to the lack of resources and lack of adaptations minimum (negligible) growth occurs in this phase.

2. Log Phase:

3 Sub Stages -

(i) Positive Acceleration phase:

In this stage, growth rate increases with the development of resources and adaptation. In this stage. Birth rate increases and death rate is negligible.

(ii) Exponential Phase:

In this middle stage of log phase, species completely become adapted to their new environment dur to presence of sufficient resources, rapid growth occurs in this phase.

Birth rate - Very high

Death rate - Low

This phase for human population begin in 1750 A.D. Now the population is running in this phase.

(iii) Negative acceleration phase:

In this stage of log stage growth rate decrease because resources start become limited in this stage. Growth rate decrease in this phase so this called negative acceleration phase.

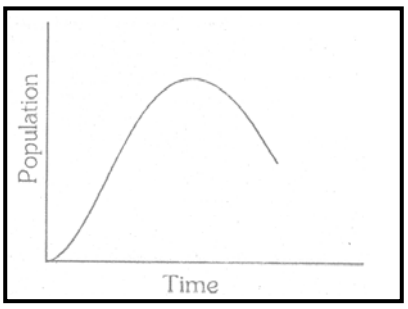
3. Stationary phase/ plateau phase / equilibrium/zero phase / constant phase.

In this last stage of growth curve, resources become limited so zero growth occurs in this phase.
In this stage birth rate is equal to death rate so the growth rate is zero.

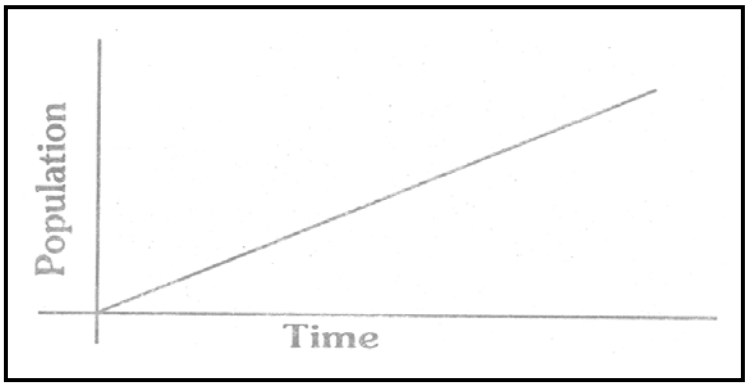
This stage for human population will occur when population reaches carrying capacity, (8-10 Billio).

- In the growth curve of bacteria after stationary phase with the end of resources growth rate also decreases so there are 4 stages in the growth curve of bacteria.

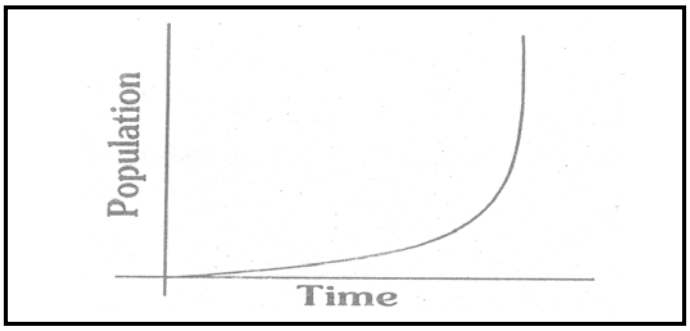
I - Lag phase
II - Log phase
III - Stationary phase
IV - Decline phase



- If semi log curve ploted for per minute growing bacteria (b/w-time & growth) curve is **ascending straight line.**



- **For micro Organisms** (like alage, blooms, fungi, some insect and annual plants, Reindeer and lemming of Tundra) growth Curve is J- Shaped in which 3 stages are present.



(1) **Lag Phase :**

In this stage a new species comes into the new environment so minimum growth occurs in this phase.

(2) **Exponential Phase :**

Due to presence of sufficient resources these organisms show rapid growth.

(3) **Crash Phase :**

With end of resources species escape from this environment in any other new environment in which resources are sufficient in amount or this leads to mass starvation and Mortality.

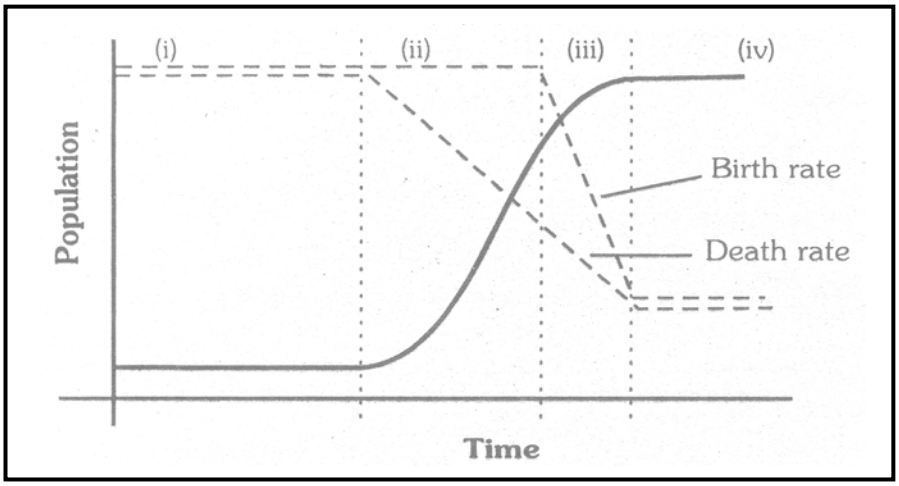
Demographic Transition in Demographic Cycle:

When birth and death rates were equal, a zero population growth rate would result which is called demographic transition. Demographic transition might occur in all countries as they become developed. But it may take many decades.

Demographic cycle – mainly 4 steps occur –

(i) First Stage (High stationary):

$$B_{high} - D_{high} = O$$



This stage is characterized by high birth and high death rate which cancel each other and population remain stationary

Ex. : India was in this stage till 1920.

(ii) Second satge (Early expanding) :

$$B_{high} - D_{low} = G$$

The death rate begins to decline while the birth rate remains unchanged.

Ex. : Many countries of South Asia and Africa, Bangladesh, Kanya.

(iii) Third stage (late expanding):

The death rate decline still further and the birth rate tend to fall the population continues to grow because birth exceed death.

Ex. : India, China, Singapore

(iv) Fourth stage (Low stationary) :

$$B_{low}\text{-}D_{low} = O$$

Low birth and low death rate with the result the population become stationary.

Ex. – Austria, U.K., Denmark, Swedeen.

Defination :

1. Exponential growth and Human population explosion.

In 1700 A.D. human population was around .6 billion. At the beginning of the twentieth century, it increased to 1.6 billion, and by the end of the century, the human population stood at 6.1 billion. This dramatic increase in population size over a relatively short period is called population explosion. In the 150 years from 1700 A.D. human population doubled from .6 billion from 0.6 billion to 1.2 billion. In contrast, it increased five-times during the next 150 years.

Reason of population Explosion:

(1) Decline in death rate – In India the death rate per 1000 was 44.4 in 1901 & 12.5 in 1981 and 9.8 in 1991.
It is due to better medical care.

(2) Longer life span-Life expeetancy has increased in most countries, 75-80 years in advanced countries & 56-60 years in developing country.

(3) Increased food out put.

(4) Better storage & transport facility

(5) Illiteracy.

(6) Early marriage

(7) Traditonal religious beliefs

(8) Desire of male child

(9) Lack of entertainment facility.

2. Maximum Carrying Capacity:

Maximum population size that can be supported by the environment is called the maximum carrying capacity (8-10 billion).

There is a limit of maximum population size (number of individuals) that can be supported with a given space and resource base. The maximum population size that can be supported by the environment is called the maximum carrying capacity. For this purpose it is useful to consider environment as having the following three major components:

(i) The first component consists of **productive systems,** such as croplands, orchards, etc. and provides food and fibre;

(ii) The second component comprise **protective systems,** such as climax forests, oceans, etc. It buffers air and water cycles, moderates extremes in temperature, et.;

(iii) The final component has **waste assimilative systems,** such as water ways, wetlands, etc, that assimilate the wastes produced by human activities.

3. Sustainable development :

Development that meets the needs of present without compromising the needs of future generations.

4. Vital Index :

It is percentage ratio of natality and mortality in a population.

V.I. =

> 100 = (+) ve growth (Population is increasing)
100 = O growth
< 100 = (-) ve growth (Population is descreasing)

5. Generation time or population doubling time:

Time between birth of individual and birth of their off spring. Or in bacteria time between two divisions is E. coli 20 min. Tuberculosis – 20 hour, lepra bacilli -20 days.

6. Replacement Level (R.L.):

Number of children a couple must produce to replace themselves. The actual R.L. is always slightly high than 2.0 since some children will die before reaching reproductive age.

In developed countries = 2.1

Developing Countries = 2.7 Due to higher death rate at the immature stage and shorter life expectancy)

Malthus theory of Human Population growth:

In 1778, T.R. Malthus a brithish economist, pur forward a theory of human population growth in his **'Eassay on population'.**

(1) He stated that population grows geomertrically when unchecked but food supply grow only arithmetically.
(2) Naturally after some time an imbalance would occur in the population and the environment.
(3) When the imbalance reaches a certain value, some factors like hunger, epidemies, earth quakes, war, etc. will bring the population to a desired level such factors are called "Possitive checks by Malthus" (Catastrophic factor of popuation).

Special point :

1. Anthropology – Sceindific study of man (orgin, development of physical, culture religious and social attributes)
2. Species occurring in different geographical area are called allopatric.
3. Set of condition and resources used by population is called "Nichi of population".
4. World population consume 10^7 tons of food per year.
5. First 'National population policy' is framed in April 1976. It called for an increase in legal minimum age of marriage from 15 to 18 for females and 18 to 21 for males.
6. Total fertility rate (TFR) – is the average number of children that would be born to a women during her life time.
7. Net reproduction rate- is defined as number of doughter a new born girl will bear during her life time.
8. Reduction is birth rate rather than death rate is the only solution to control the world population problem.
9. In tissue culture cells always show exponential growth.
10. The S-shape sigmoid growth form is represented by the following equation:-

$$\frac{dN}{dt} :$$

= rate of change in population size r =biotic potential

N = population size K = carrying capacity

= environmental resistance

FAMILY PLANNING

Family planning refers to practices that help individual to attain certain objectives

(i) To avoid unwanted Births

(ii) To Bring about wanted birth

(iii) To regulate the interval between pregnancies

(iv) To determine the number of children in family

India is first country in world to launched family planning programe 1952. In 1977 it changed into family welfare programme "To improve the quality of life of people."

Small family norm

1970 slogan was – "Do ya teen Bas"

1980 Slogan was - "Sons or Daughter –Two will do"

- "Second after 3 years"s

CONTRACEPTIVE METHOD :

Method which prevent unwanted birth or pregnancies are called contraceptive methods.

(2 types)

(1) Temporary method or spacing method (2) Permanent of Terminal method

(1) **Temporary or Spacing Methods :** Are of 5 types –

(i) Chemical Method:

In this method chemicals are used which are spermicidal agent or surface active agents which attach themselves to spermatozoa and inhibit O_2 uptake and kill sperm.

Example :

Vaginal Foam/tablets = **'Today'**

Cream or Jelly = **"Nim-76",** (DIPAS)

(Difence Institute of Pure Applied Science manufacture it)

These medicines are composed of chemicals like **ZnSO4, KmNO4, Boric acid, Lactic acid, Citric acid.** These chemicals completely destroy sperms so they are called as **spermicides.**

(ii) Mechanical or barrier method:

For Femal :

Intra – Uterine Devices (I.U.D.):

I.U.C.D. – Intrauterine Contraceptive devices:

Ist IUCD was used by graffenberg. It was a Ag made I.U.C.D. when it was put into the uterus, till it was there, the female wasn't pregnant.

Now **Cu** made IUCD are used.

Mechanism :

These I.U.C.D. secrete Cu or Ag ions. These ions cause thickness of Cervical mucous (Enzymatic action) or **Inactivate the motility of Sperm,** so sperm do not reach upto ovum hence fertilization is absent.

Cu – T : T – shape Cu made IUCD it prevent implantation of blastocyst is uterus.

Other I.UC.D.

- Spiral
- Lipps Loop

These IUCD act as barrier b/w sperm and egg.

- Veginal diaphragm

For Male: Condom – Made up of latex. They also act as barrier between sperm and egg hence fertilization is absent.

Share
Rakshak] Ist Indian condoms mfg. by Hindustan latex Lim.

(iii) Harmonal Method :

This is the most effective method (almost 100% effective)

Most widely used contraceptive method. In this method oral pills and injection are used.

Oral pills are -

(1) Mala – N, Mala –D – Daily oral pills

(2) Saheli – Weekly oral pill (Mfg. by Hindustan Latex Ltd.)

(3) Quinestrol – Monthly

The daily oral pills are stared from 5^{th} day of Menstruation cycle for 1 to 21 days Hormonal pills are given and Iron or Fe pills are given in last 7 days for recovery of blood loss in menstruation flow.

In Composition of oral pill.

(a) Norethisterone acetate (Synthetic progesterone)

(b) Ethynyl estradiol (Synthetic Estrogen)

Mechanism :

Action of oral pill is to prevent the Ovulation from ovary this is achieved by blocking the pituitary Secretion of gonadotropin (FSH and LH) that is necessary for ovulation Progestron only preprations render the cervical mucous thick and scanty this inhibit sperm penertration. So fertilization is absent.

Male Pill:

Gossypol - Made from cotton seeds. This pill prevent spermotgenesis. Now it has been baned because it permanent azospermia (preventing spermatogenesis) progesterone harmone can be used in male oral pills.

In july 2000 china made progesterone pills for male (first time in world).

Injection -

DMPA – (Depot – medroxy progesterone acectate) (Depot = slow release) Subcutaneous injection /Norplant.

In these Injections high level of progesterone Hormone is present which Inhibit secretion or gonadotropins so ovulation in absent.

(iv) Natural method :

(a) Rhythm or periodic abstinence method – Ist 7 days after menstruation Cycle (M.C.) and 7 days before M.C. is called safe period because in these 14 days ovum is absent in fallopian tubes. Hense fertiliazation usually does not occur.

(b) B.B.T. (Basal Body Temp.) – At the time of ovulation BBT by $1/2^0$C due to in BMR

(c) Withdrawal of coitus interruptus – During sexual intercource, if male withdraws his penis from vagina just before ejaculation.

(d) Lactational amenorrhoea – High concentration of prolactin may lead to inhibition of menstrual cycle in lactating mother.

(v) M.T.P. (Medical Termination of Pregnancy)

Now it has been banned by M.T.P. act 1971 But in few cases M.T.P. is permissed.

It is relatively safe in Ist trimester

Condition of MTP.

(i) Medical – When pregnancy might endanger to mother's life.

(ii) Eugenic – When child being born with serious illness.

(iii) Humanitarian –Where pregnancy is result of rape.

(iv) Socioeconomic- If mother is having more than 2 to 3 child.

(v) Failure of contraceptive devices.

(2) Permanent or Terminal method :

It is a surgical method.

Female sterlisation – 85%

Male sterlisation - 10 to 15%

For male : **Vasectomy**
To Cut of vas deferens. So ejaculation of sperm does not occur.

For Female : Tubectomy - To cut of Fallopian tubes.
Tubal ligation – To ligate fallopian tubes.

INFERTILIGY:

If couples are unable to produce children inspite of unprotected sexual cohabitation up to 1 year this is called infertility. It is preveneted by assisted reproductive technologies (ART).

It is two types-

(i) Invitro fetilisation – If fertilization occurs outside the body of female and after it, embryo is transferred into uterus or fallopian tube of surrogate mother or same mother, this is called embryo transfer. Two types of Invitro fertilization -

(a) **Zygote intrafallopiun transfer (ZIFT)-** Zygote or early embryos (with upto eight blastomer) could then be transferred into the fallopian tube of surrogate or same mother. This is called ZIFT.

(b) **Intrauterine transfer (IUT) –** If more than eight blasomers (commonly 32 cells stage) transfer into uterus, this is called IUT.

(ii) Invivo fertilization –If fertilization occurs inside the body of female either natural or artificial this is called invivo fertilization.

(a) Gamete intra fallopian transfer (GIFT)- Transfer of an ovum collected from ovary into the fallopian tube of same female or female who can't produce one, but can provide suitable environment for fertilization, this is called GIFT.

(b) Intracytopasmic sperm injection- It is an another specialized procedure to form an embryo in the laboratory in with a sperm is directly injected into the ovum.

(c) Artificial insemination- If male is unable to inseminate the semen into vagina then semen is ejaculated artificially either into vagina or into the uterus of the female (intrauterine insemination).

Test- Tube Baby :

In Vitor fertilization, fertilization outside the fallopian tube in a test tube.

(In vitro-Study of animal tissue outside the animal body in artificial medium).

(In Vivo: Study of animal tissue inside the animal body in its natural form).

After the fusion of gametes zygote is formed which reaches the 32 celled stage within 24 hr. now this embro (blastocyst) is transplanted in normal uterus of same mother or surrogate mother for further development after the completion of gestation period a normal child take birth.

Ist test tube baby : England, 25 July, **1987, Louise Joy Brown**
India : Ist test tube baby is approved as **'Durga'.**

Amniocentosis:

In the 14^{th} or 15^{th} week of pregnancy with the help of long surgical needl, amniotic fluid is taken out from the uterus. In this fluid, few cell of embryo (skin, liver and placenta) are present.

They are tested to know-

(i) Genetic disorder / chromosomal abnormalities like down syndrome

(ii) Metabolic disorder (deficiency of protein, enzymes, harmones)

(iii) Detection of Sex (Barr bodies)

This test has been baned and replaced by Ultra Sono Graphy (U.S.G.)