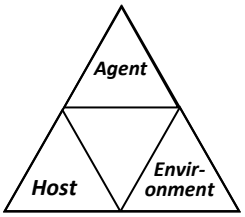
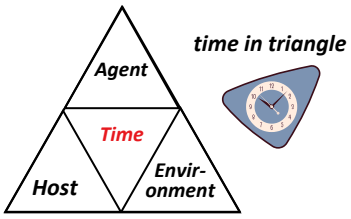
14 CHAPTER

PREVENTIVE AND SOCIAL MEDICINE

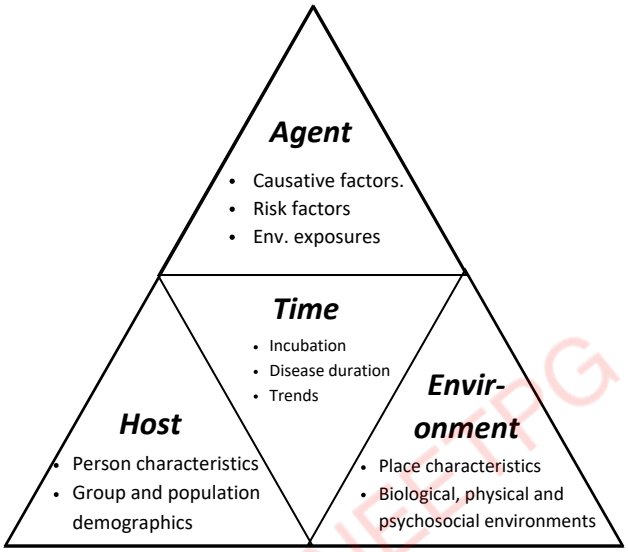
Epidemiology - definitions



Epidemiological **triad**



Epidemiological **triangle**



Advanced Epidemiological **triangle**

- First case in community: **Primary case**
- First observed case: **Index case** ***(observed is index, vowels stick)***

- Time between primary and secondary case: **Serial interval**
- Time between entry of organism and symptom: **Incubation period**
- Time between entry of organism and max communicability: **Generation time**

- Isolation: **For diseased**
- Quarantine: **Healthy individuals** *(quarantine period = incubation period)*
  *QP of Yellow fever: **6 days** ***(Yellow has 6 letters)***

Father of epidemiology : **John Snow**
Definition of epidemiology : **John Last**
We define at last

Health indicators:

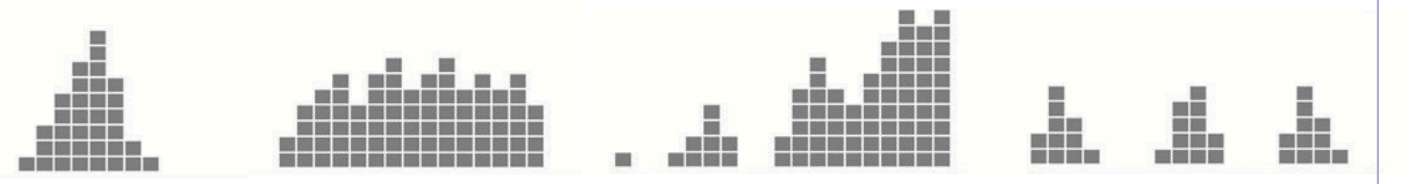
1. **Virulence** (*killing power*) of disease - **Case fatality rate** *(it's a proportion)*

$$\frac{\text{Death}}{\text{Affected}} \quad \textit{(due to a certain disease)}$$

2. **Communicability** of disease - **Secondary attack rate**

$$\frac{\text{No. of } \textbf{new cases}}{\text{No. of } \textbf{susceptible individuals}} \quad \textit{(within 1 incubation period)}$$

Epidemic trends



Point source
single exposure

Point source
multiple exposure

Propagated epidemic

Interrupted epidemic

Disease control

CONTROL
No more a **local health problem**

NVBDCP
(*National vector born disease control program*)

ELIMINATION
Interruption of transmission

Elimination levels
- **Leprosy**: (< 1 case/10,000 population)
- **Neonatal tetanus** (< 1 case/1000 live births)

Diseases Eliminated
1. **Guinea worm** aka *Dracunculiasis*
2. **Leprosy**
3. **Yaws**
4. **Neonatal tetanus**

NTEP
(*National TB elimination program*)

ERADICATION
Removal of organism "**globally**"

Diseases Eliminated
1. **Small Pox** (8 May, 1980)

NLEP
(*National Leprosy eradication program*)

Disease Surveillance

Disease Surveillance

Passive surveillance
Patients in **hospital**

Active surveillance
Disease actively **searched in community**

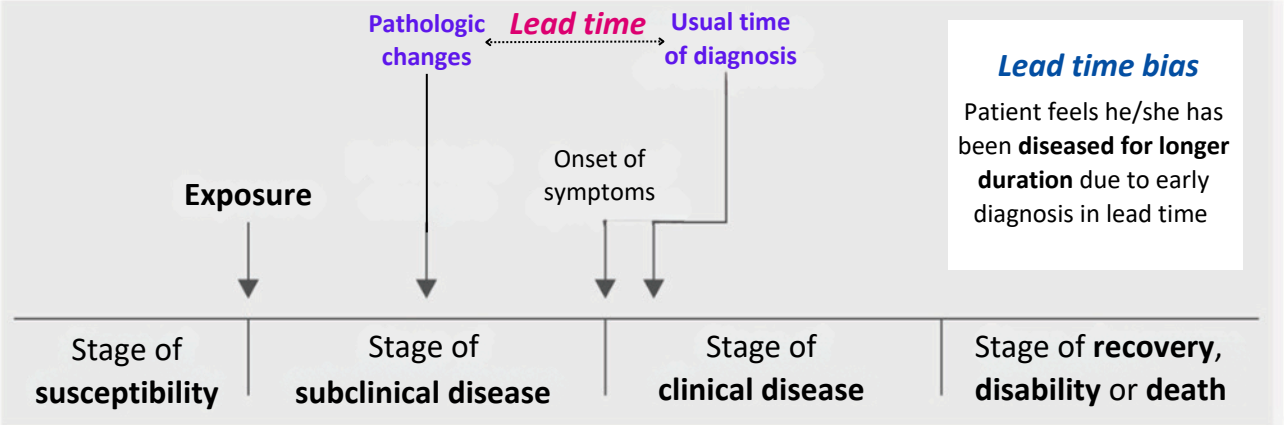
1. **Polio :** SMO (Surveillance medical officer)
2. **Malaria :** Male MPW
3. **Kala Azar**
4. **TB :** AASHA

Sentinel surveillance
Targeted approach to find out **missing cases**

Done for HIV AIDS
- **Once** in **2** years
- Data collected from **8** high risk groups
  1. **Pregnant women** (*can be opted out*)
  2. Female **sex workers**
  3. **Men having sex with men**
  4. **IV Drug abusers**
  5. **Transgenders** (*Hijra*)
  6. Single male **migrants**
  7. Long distance **truck drivers**
  8. **Inmates** at Central prison

Polio (AFP) Surveillance
- Done by SMO (Surveillance medical officer)
- Children **0-15** years checked for flaccid paralysis
- **2 stool samples** (24-48 hrs apart) are sent using **reverse cold chain**

Natural course of a disease



Lead time bias

Patient feels he/she has been **diseased for longer duration** due to early diagnosis in lead time

Levels of Prevention

Healthy 18 year old doing yoga	*Healthy **50 year** old doing yoga*	***Diabetic** 50 year old doing yoga*	***Dressing of diabetic foot disease***
No risk factor → **Primordial** prevention	Risk factor → **Primary** prevention	Disease → **Secondary** prevention	Disability → **Tertiary** prevention
• Health **education**	• Health **promotion** *(lifestyle modification)* • **Specific protection** *(vaccination)*	• **Early diagnosis** *(Screening)* • **Treatment**	• **Disability limitation** • **Rehabilitation** Eg. • Crutches • Spectacles • Physiotherapy

***P**rophylaxis and **p**revention- **P**rimary*
***S**creening and treatment- **S**econdary*

- Vaccines - **Primary**
- Post-exposure prophylaxis - **Primary**
- BCG for ca. of UB - **Secondary** (*treatment*)
- Contraceptives - **Primary**
- OCP for PCOD - **Secondary** (*treatment*)
- Physiotherapy for polio - **Tertiary**
- Chemoprophylaxis in contacts - **Primary**
- Mosquito repellants / Nets / DDT - **Primary**
- IFA in pregnancy - **Primary**
- Fetal USG - **Secondary** (*screening*)
- Seat belt/ helmet : **Primary**

"Check if the procedure is preventing or treating/screening"

- **Prospective** screening : **Primary** *(screening for others, eg screening of blood in blood bank for HIV)*
- **Prescriptive** screening : **Secondary** *(screening for oneslef)*

Epidemiological Studies

1. **Descriptive** : Formulate a hypothesis (eg. *case reports*, *case series*)
2. **Analytical** : Test that hypothesis
3. **Experimental** : Confirm the hypothesis

"DAE" (*similar to steps of PCR*)

Analytical Studies

Population based

Ecological studies
(aka aggregation studies)

- Uses **2° data** *(data from records)*
- **Ecological fallacy** seen here *(If a school has high average test scores, assuming every student in that school is above average would be an ecological fallacy)*

Individual based

Cross-sectional studies
(aka Prevalence studies)

- aka **snapshot study**
- Uses **1° data**

Case Control studies
(Retrospective study)

"Case ho gaya" kaise hua?

- Start with a disease and **look for exposure**
- Best study for **multiple exposures**
- Best for **rare diseases** (*ask the person what had he done to get such a rare disease*)
- **Odd's ratio** is calculated
- Bias involved are
  1. **Recall bias**
  2. **Selection bias** (*selecting a control*)
  3. **Berkesonian bias** (*when study sample is from hospital only*)

Cohort studies
(Prospective study)

Observing a cohort

- aka **Incidence study**
- Starts with exposure and **look for disease**
- Best study for **multiple outcomes**
- **Relative risk and attributable risk** is calculated
- Associated with long duration of study and **attrition** *(drops outs)*
- Bias involved are
  1. **Hawthorne bias** (*change in behaviour while being observed*)

  Co-Hawth studies

Odds Ratio

- *Also known as **cross product ratio***
- *From **case control studies*** *"Control the odds"*

	Disease (Case)	No Disease (Control)
Exposed	A	B
Unexposed	C	D

$$\frac{\text{Odds that a case was exposed (A/C)}}{\text{Odds that a control was exposed (B/D)}} = \frac{AD}{BC}$$

Relative risk

- *From **Cohort study***

$$\frac{\text{Incidence in exposed}}{\text{Incidence in non exposed}} = \frac{I_e}{I_{ne}}$$

Attributable risk

*the **proportion of a disease** that can be attributed to a particular risk factor*

$$\frac{I_e - I_{ne}}{I_e}$$

What percentage of Lung Cancer is due to smoking?

Population Attributable risk

*the **proportion of a disease in a population** that is caused by a specific risk factor*

$$\frac{I_{total} - I_{ne}}{I_{total}}$$

If smoking was eliminated, what would be the decrease in lung ca. in population.?

Retrospective cohort

- Go from exposure to disease (cohort)
- The study is based on **data already collected**, hence retrospective.
- Eg. Checking records of hospitalised TB patients (*TB is exposure*) for those who developed pericarditis (*disease*).
- Benefit : **Saves time**

Nested Case Control

- Its a **prospective study** (*case control*) done on a defined cohort.
- Done for **rare/expensive investigations**

Experimental studies

Randomised controlled trials (RCT)

- Randomisation eliminates **selection bias**
- **Randomisation is heart of RCT**
- Randomisation also removes confounders
- Eg. *Clinical drug trials*

Non randomised

- eg. Field trials, community trials

Blinding
done to remove bias

1. **Single blinding :** Only patient
2. **Double blinding :** Patient & doctor
3. **Triple blinding :** Patient, doctor and epidemiologist

Blinding doesn't remove confounders

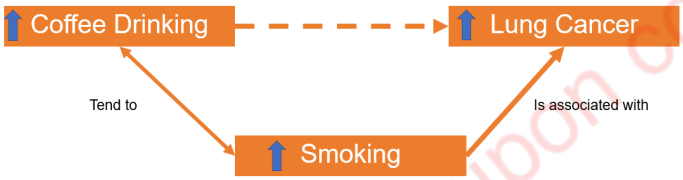
Clinical Drug Trials

Stage 1 : **Healthy volunteers**, safety checked (**pharmacokinetics** checked)
Stage 2 : **Patients** (*small sample*), efficacy checked (**max drug failure**)
Stage 3 : **Patients** (*large sample, RCT*), checked if improvement over existing drug.
Stage 4 : **Post marketing trial**, for long term adverse effects

Confounders and Effect-modifiers

Confounding

- Confounder is **related to both** risk factor and the disease.
- *Smoking* is confounder here in the example
- Solution : **Stratifying** study into smokers and non smokers



- **Matching** is best method to eliminate known confounders
- Methods to eliminate known + unknown confounders include :

1. **Randomisation**
2. **Stratification** (separate smokers from non smokers)
3. **Restriction** (restrict smokers from trial)
4. **Stratified randomisation**
5. **Multivariate analysis/ Statistical modelling**

Effect modifier

- Effect modifiers increase the strength of association of risk factor with the disease
- There is no solution to manage effect modifiers
- In the following example, being male is an effect modifier

For males

For females

Sensitivity and Specificity of a test

"Always make a table and keep disease on top"

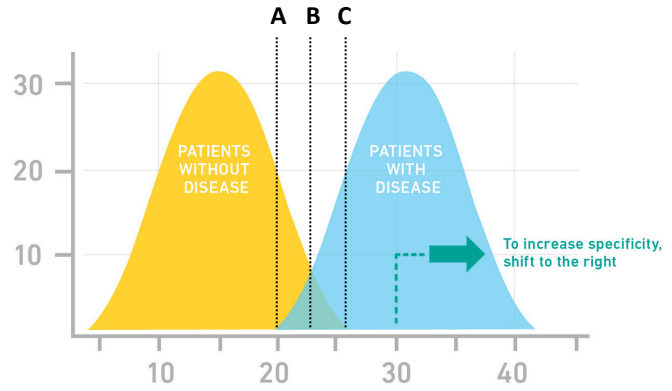
	Disease (+)	Disease (-)
Tested (+)	**a** True Positives **(TP)**	**b** False Positives **(FP)**
Tested (-)	**c** False Negatives **(FN)**	**d** True Negatives **(TN)**

$$PPV = \frac{a}{a+b}$$

$$NPV = \frac{c}{c+d}$$

Sensitivity $= \frac{a}{a+c}$

Specificity $= \frac{b}{b+d}$



- **Higher specificity** for threshold **C** (100%) **> B > A**
- **Higher sensitivity** for threshold **A** (100%) **> B > C**
- Threshold for **perfect test : B**

- **Screening test** : Test with high sensitivity
- **Confirmatory test** : Test with high specificity

Sensitivity

- Ability to identify those **with** the disease
- aka **true positive rate**

Specificity

- Ability to identify those **without** the disease
- aka **true negative rate**

PPV

- Probability that a person tested positive actually has the disease
- aka **pretest probability**

NPV

- Probability that a person tested negative actually doesn't have the disease

$PPV \propto$ Prevalence

$Sn \propto 1/Fn$

$Sp \propto 1/Fp$

- **Sensitivity decreases** if tests in **series** & *vice versa*.
- **Specificity decreases** if tests in **parallel** & *vice versa*

*"**Series** of stimuli makes you **less sensitive** towards it"*

Bland Altman analysis

Comparing newly developed test with the **gold standard**

Incidence and Prevalence

Incidence

- It's a **rate**
- **New cases /unit time**

Prevalence

- Its a **proportion**
- **Cases/population × 100**

Prevalence in a period of time

(Incidence **X** *Duration)*

	INCIDENCE	PREVALANCE
Increased survival	-	↑
Increased mortality	-	↓
Faster recovery	-	↓
Vaccination	↓	↓
Primordial prevention	↓	↓

Types of Data

Data

Qualitative

Nominal data
- No order or meaningful interval
- eg. male/female, urban/rural

Ordinal data
- **Order** present
- No meaningful interval
- eg. TNM Staging, Likert scale

Quantitative

Interval data
- **Order** present
- **Meaningful interval** present
- No true zero
- eg. Temperature scales

Ratio
- **Order** present
- **Meaningful interval** present
- **True zero** present
- eg. Weight, BP, BMI

Measures of central tendency

1. **Mean** : Average
2. **Median** : 50th centile
3. **Mode** : Repeats the max

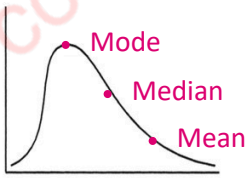
- Best measure of central tendency <u>overall</u> : **Mean**
- Best for <u>ordinal data</u> : **Mode**

- <u>Most affected</u> in skewed data : **Mean**
- <u>Least affected</u> in skewed data : **Mode**
- Most <u>useful</u> in skewed data : **Median**

Skewed data

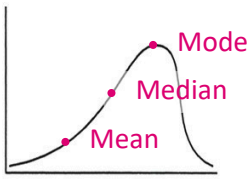
<u>Positively skewed</u>

1, 4, 8, 12, **2000**



<u>Negatively skewed</u>

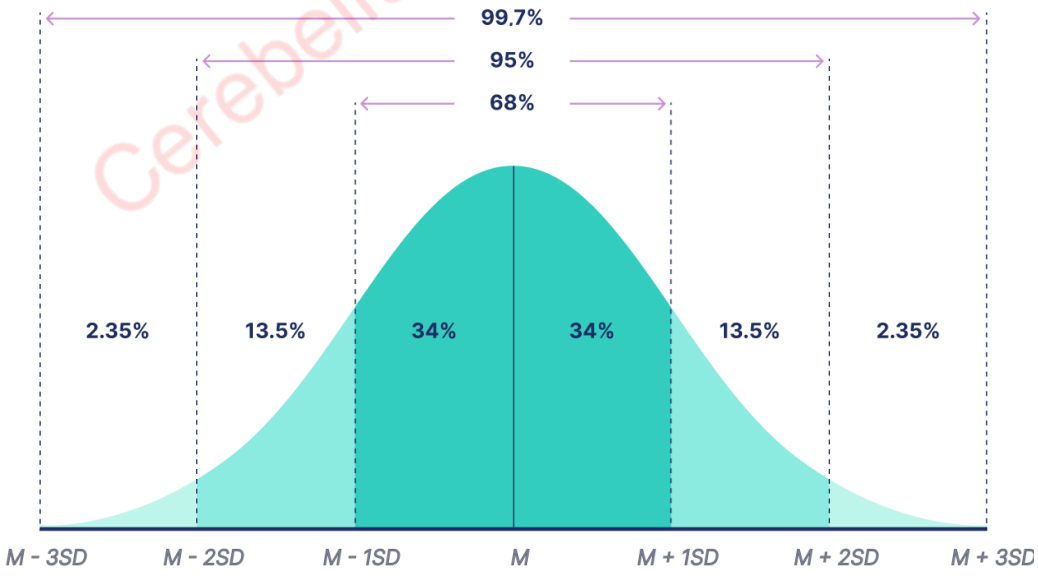
6, 800, 920, 990



- **Mean follows** skew tail (*most affected by skewed*)
- **Mode opposite** to skew (*least affected by skewed*)
- **Median stays in between** (*most useful in skewed*)

Standard distribution curve

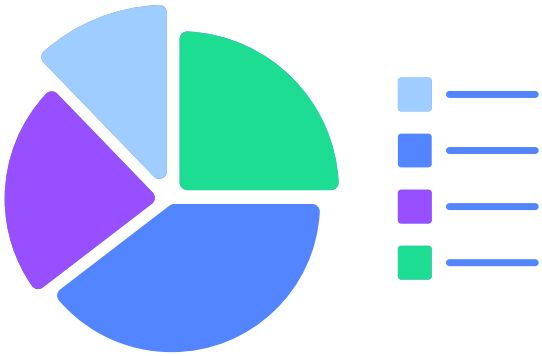
aka Gauccian curve



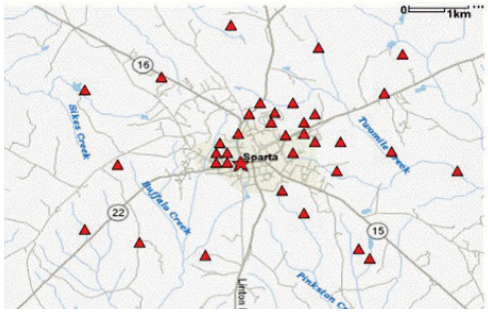
Mean = Median = Mode

Graphs

Pie chart

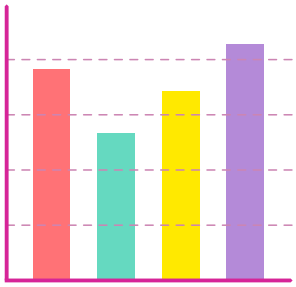


Spot Map

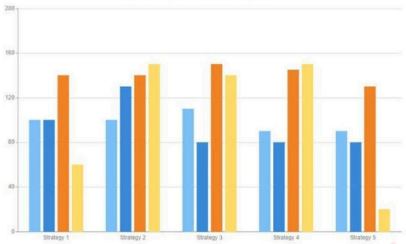


Source of **cholera** in London was identified by **John Snow** using this method

Bar Chart (discrete data)



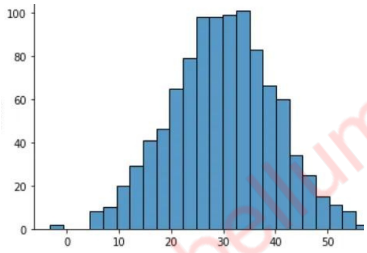
Normal bar chart



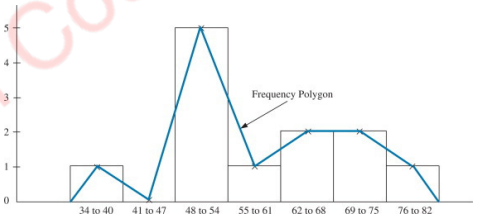
Multiple bar charts

Composite bar chart

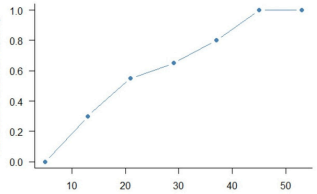
Continuous data



Histogram
Continuous data
(don't confuse with bar graph)

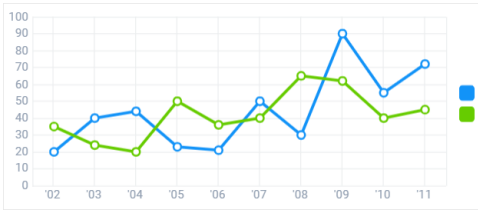


Frequency polygon
Derived from histogram



Ogive
Similar to frequency polygon but only take **cumulative data**
*"Data that **goes on giving** is **ogive**"*

Line chart

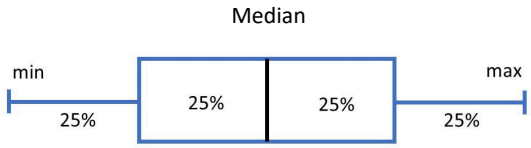


Shows **trends of diseases** over time

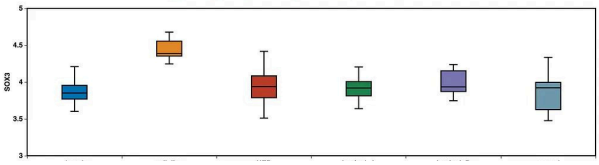
1. **Seasonal trend :** *AGE* in rainy, *Heat stroke* in summer, etc
2. **Cyclical trend :** *Influenza pandemic* occurs every in 7-10 yrs
3. **Secular trend :** Consistent rise as in *NCDs* or consistent fall as in *TB/Polio*

Box and Whisker chart

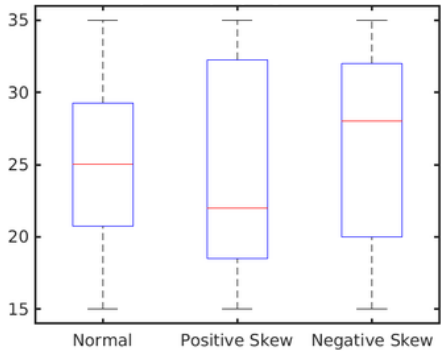
Data divided in **4 quartiles**



Normal distribution in box and whisker chart

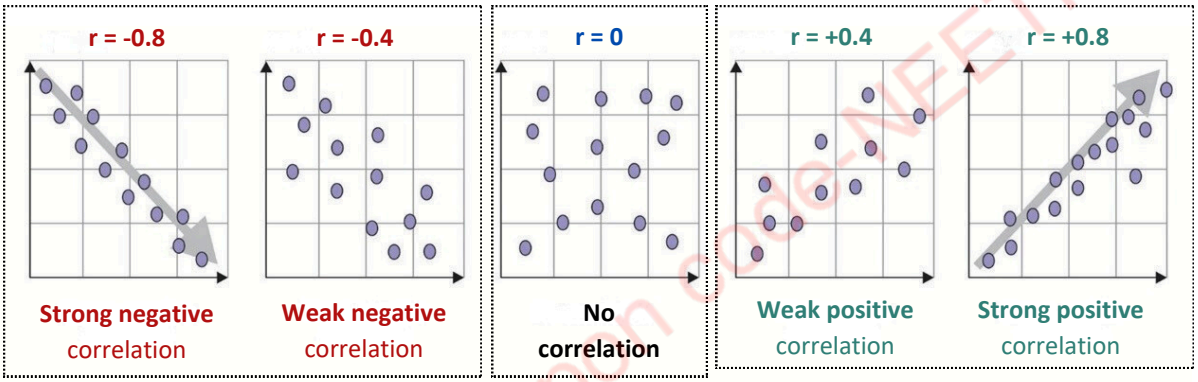


Data interpretation using box and whisker chart



Skewed distribution in box and whisker chart

Correlation Coefficient (r)



Strong negative correlation

- Goes downward : **negative**
- Concentrated : **strong**

Weak negative correlation

- Goes downward : **negative**
- Dispersed : **weak**

No correlation

Randomly scattered

Weak positive correlation

- Going upwards : **positive**
- Dispersed : **weak**

Strong positive correlation

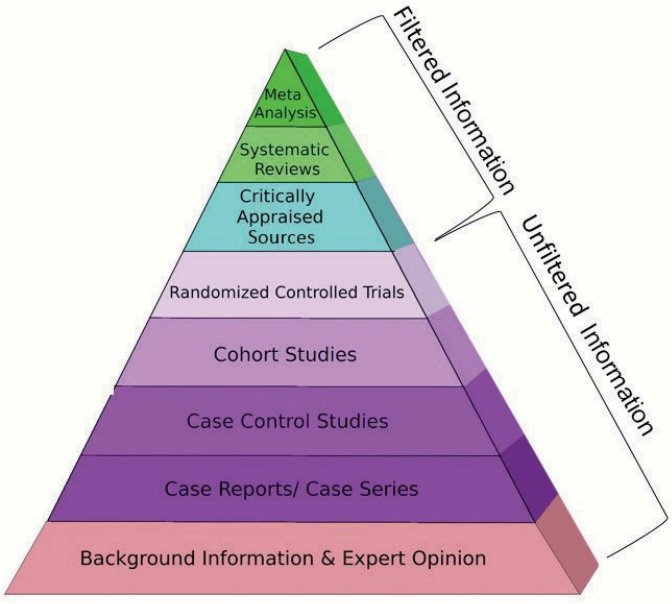
- Going upwards : **positive**
- Concentrated : **strong**

Evidence based medicine

Father of evidence based medicine : ***David Sackett***

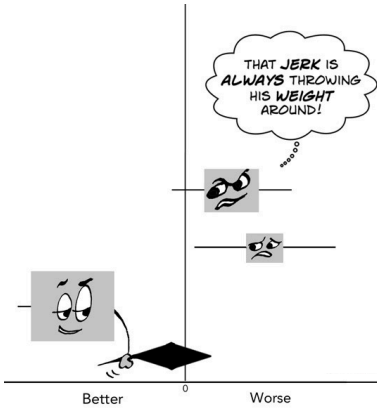
Systematic Reviews

- "***Focused question***" formulated
- Literature is searched through
- **Meta analysis not compulsory**



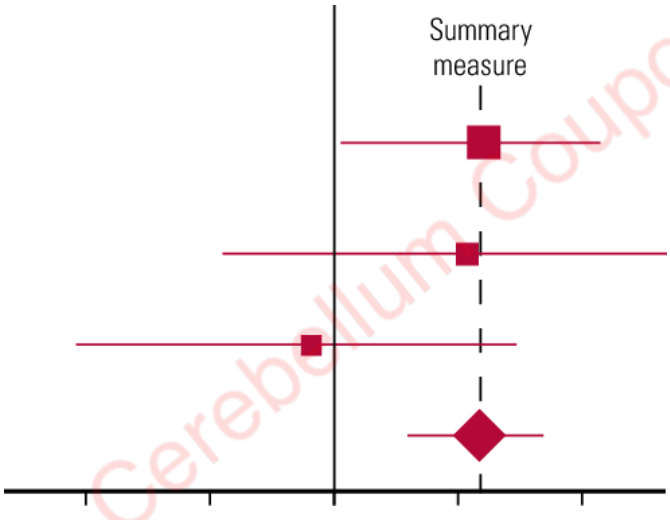
Meta Analysis

- Summarise **"quantitative"** results
- All data collected from systematic review is analysed and compared.
- Results depicted in a **Forest Plot**

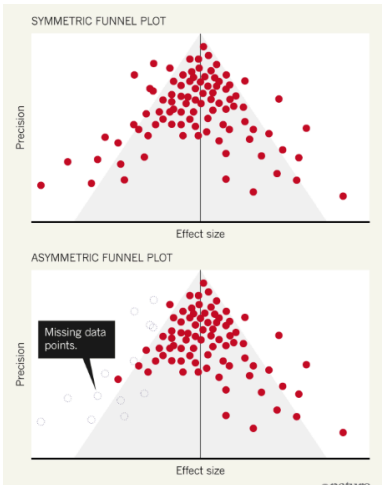


Forrest plot

Forrest plot interpretation



- Significant result can be either Odds ratio >1 (*causative*) or <1 (*protective*) based on the study.
- Size of the box denotes **weight** of the study (*more the* ***sample size****, more the weight*)
- The whiskers denote **confidence interval**
- The shape denotes **summary** from all studies



Funnel plot

Publication bias

Insignificant results don't get published as frequently as the significant results.

Alpha and Beta errors

Null hypothesis (H^0)

- **First step** is to formulate a null hypothesis
- For a drug trial, null hypotheesis would be "*New drug is not better than existing drugs*"
- **Its considered true as long as it's not proved wrong** based on experimental data

Errors

1. **Rejecting** null hypothesis when it's **not proven wrong** by data : **Alpha error** (***Alpha researcher overconfident***)
2. **Accepting** null hypothesis even when it's **proven wrong** by data : **Beta error** (***Beta researcher underconfident***)

Alpha error is a **more dangerous** error (***alpha males are more dangerous***)

P value

- The **probability of alpha error** in the study
- P value must be **<0.05** or **5%**
- Confidence level = **(1-P) ;** shall be **95%**

Q. A study finds no significant association between two variable but truly there exists a difference. What type of error is this?

A. Type I error
B. Type II error ✓
C. Random error
D. Systematic error

Power of study

- The **power of study = 1 - ß error**
- Can be increased by **increasing sample size**, **precision**

Standard error

- **Deviation** : How far away a value is from mean
- **Variance** : Mean of square of deviations of all variables (*shows spread of data*)
- **Standard deviation** : Squared root of variance
- **Standard error** : **SD/√n** *(difference of sample mean from population mean)*

$$SD = \sqrt{\frac{\sum |x - \bar{x}|^2}{n\text{-}1}}$$

- **n** = sample size
- If sample size is large, **n** can be used instead of **n-1**

Standard error

$$\frac{SD}{\sqrt{n}}$$

Standard error of proportion

$$\frac{\sqrt{P(1\text{-}P)}}{n}$$

Confidence Interval

- The **confidence interval of study = Mean ± 2(SE)**
- Confidence interval includes **95**% of the data in study

Q. A study was conducted to find average IOP. IOP in 400 people was measured and mean was found to be 25mm Hg with a standard deviation of 10mm Hg. What is the range in which IOP of 95% population would fall?

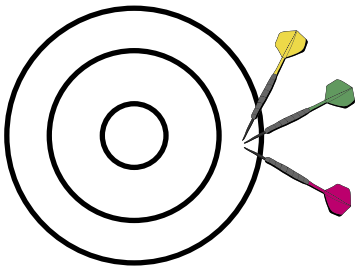
A. 24-26mm
B. 22-28mm
C. 20-30mm
D. 23-27mm

Confidence interval ?

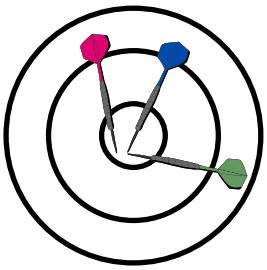
Mean ± 2SE

= Mean ± 2(SD/√n)
= 25 ± 2(10/√400)
= 25 ± 2(1/2)
= 24-26

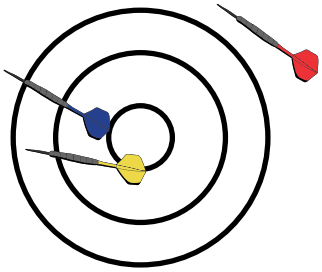
Precision and Accuracy



- Precise
- Not accurate



- Precise
- Accurate



- Not precise
- Not accurate

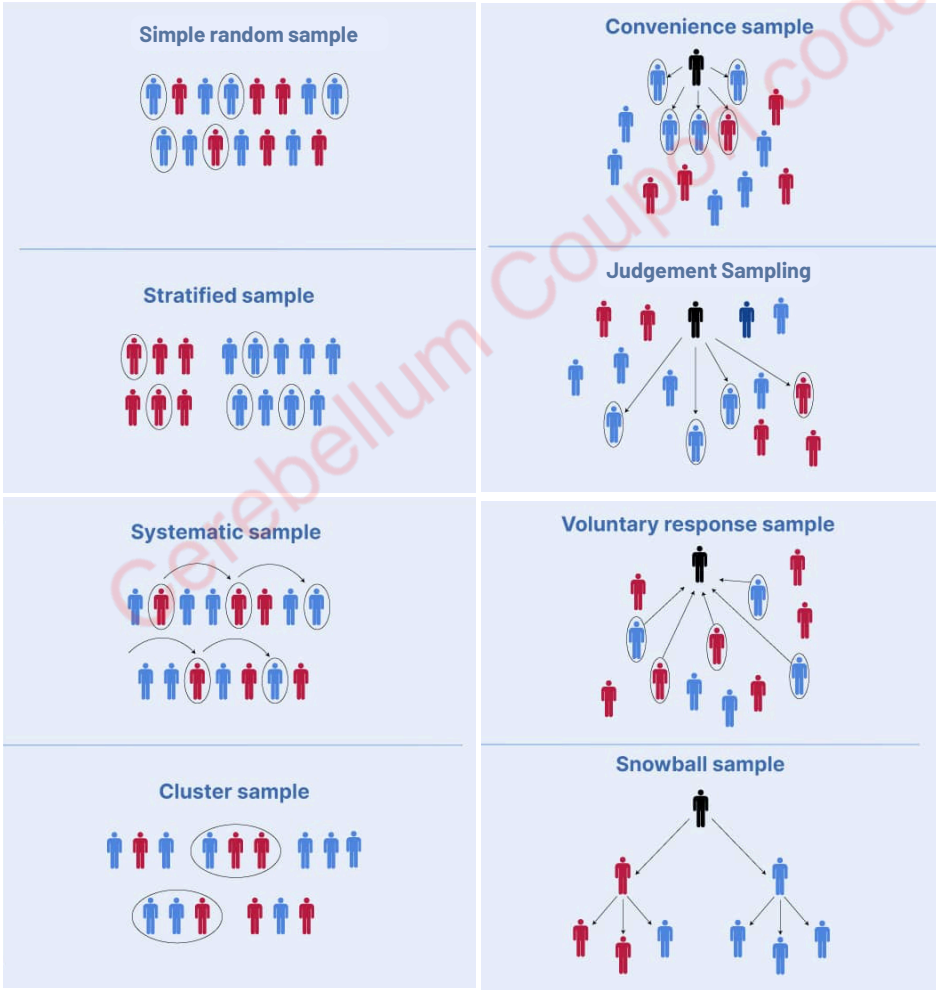
Precision *(reliability)*

- The **consistency** and **reproducibility** of a test.
- The absence of **random errors** in a test.
- Higher precision **decreases standard deviation**

Accuracy *(validity)*

- The **closeness of test results to the true values**.
- The absence of **systematic error** or **bias** in a test.

Sampling



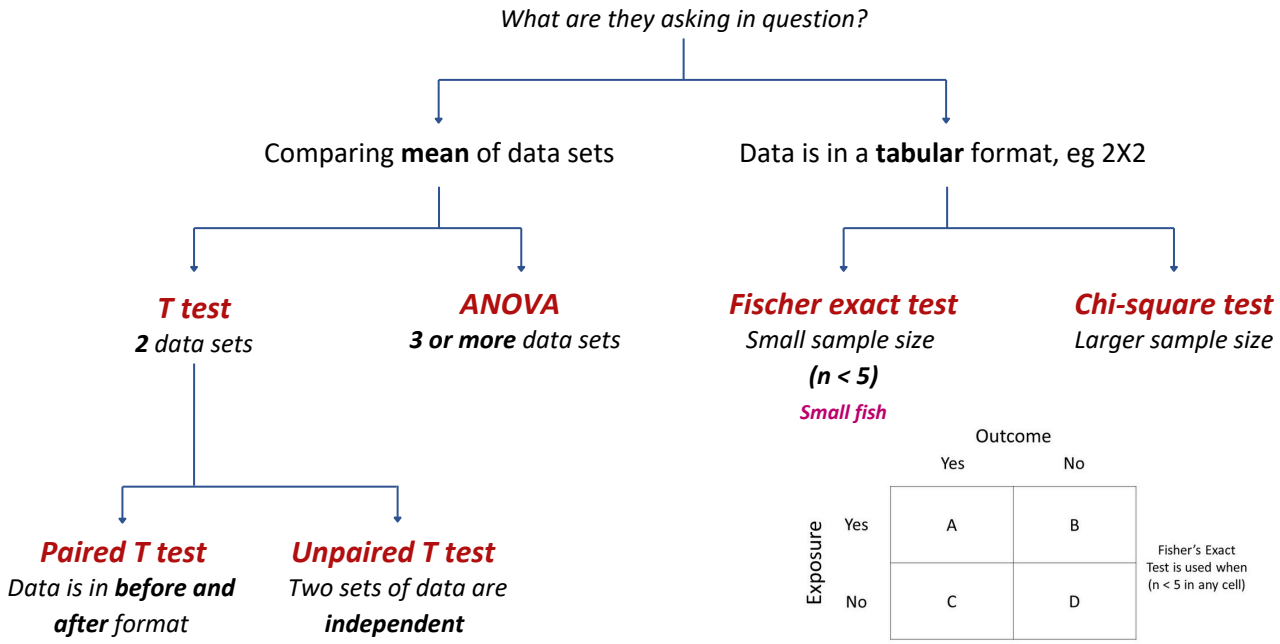
Cluster sampling done to

- Check **immunisation coverage**

Snowballing done for

- **IV drug abusers**
- **STI** patients

Tests of significance



A study was conducted to assess the association between smoking status (smoker/non-smoker) and the development of lung cancer (present/absent) in a group of 200 individuals. The following data was obtained:
Which statistical test would be the most appropriate to evaluate the association between smoking and lung cancer?

	Lung Cancer Present	Lung Cancer Absent	Total
Smoker	60	40	100
Non-smoker	20	80	100
Total	80	120	200

A. Student's t-test
B. Paired t-test
C. Chi-Square test ✓
D. ANOVA

A researcher is studying the association between a particular drug and the occurrence of an adverse effect in a small sample size. The following 2x2 table represents the data collected:
Which statistical test is most appropriate to determine if there is a significant association between the use of the drug and the occurrence of the adverse effect?

	Adverse Effect Present	Adverse Effect Absent
Drug Used	5	3
Drug Not Used	2	10

A) Chi-square test
B) Fischer's exact test ✓
C) T-test
D) McNemar's test

A group of 50 hypertensive patients was started on a new antihypertensive drug. Their systolic blood pressure was measured before starting the drug and again after 6 weeks of treatment. Which statistical test would be most appropriate to determine if there is a significant change in the systolic blood pressure of the patients after 6 weeks?

A. Chi-square test
B. Unpaired t-test
C. Paired t-test ✓
D. ANOVA

Health Indices

Individual Health index

Positive health indices

HALE
(**Health adjusted** life expectancy)
LE - (Poor health)

DFLE
(**Disability free** life expectancy)
aka
Sullivan's index
LE - (Disability)

Negative health indices

DALY
(Disability adjusted life years)
Years lived with disability + Years of life lost
Measures **disease burden**

QALY
(Quality adjusted life years)
Quality years** added to life due to a **certain intervention
Measures **cost effectiveness of intervention**

Population Health index

Human development Index (HDI)

Birth - School - Income

1. Life expectancy at **birth**
2. **Knowledge** (*years of schooling*)
3. Income (*GNI per capita*)

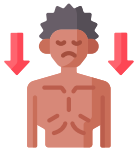
Physical quality of life index (PQLI)

1 dead infant can't read or write

1. **Infant mortality** rate
2. Life expectancy at **1 year**
3. **Literacy rate**

Global Hunger Index (GHI)

Everyone hungry



1. **Undernourished people**
2. **Underweight children** (<5 yrs)
3. **Children dying** before age 5

Demography

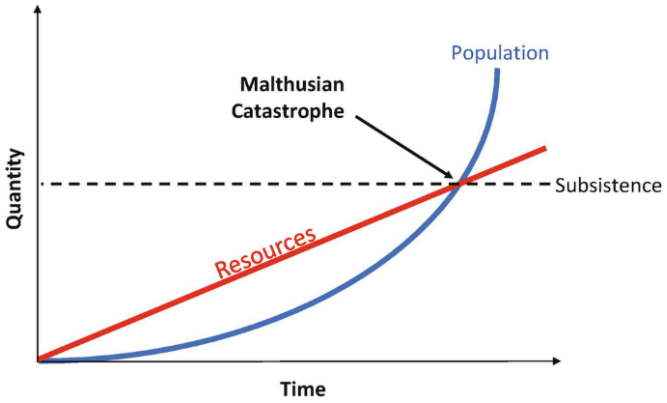
Determinants of demography

- Birth
- Death
- Migration
- Marriage
- Social mobility

Rule of 70

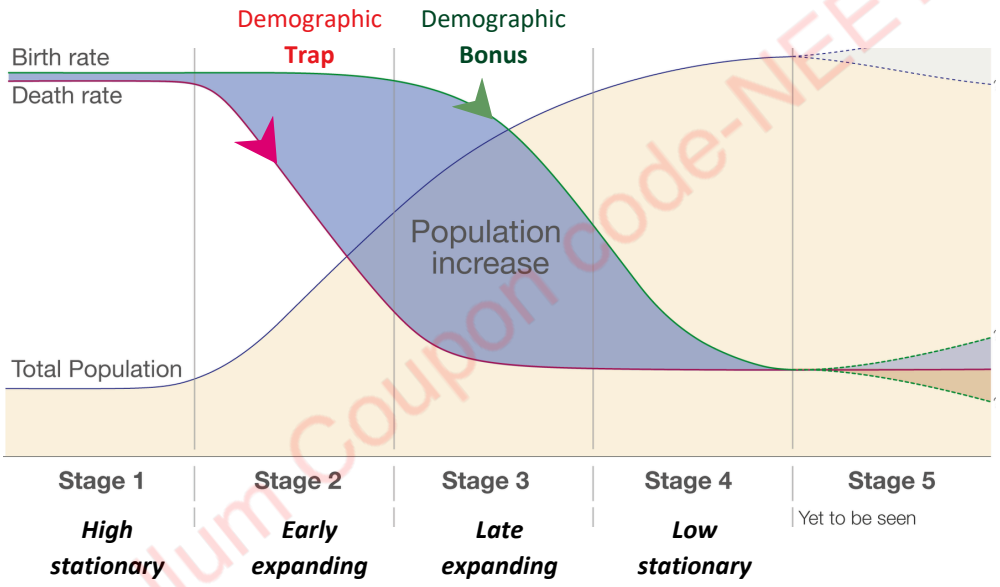
- Used to determine the number of years it takes for a population to double
- Divide 70 by the population's growth rate
- eg. **1%** growth rate : **70 years**
  2% growth rate : **35 years**

Malthusian Model of growth



This theory states that **population grows exponentially**, thus **out-growing a society's resources**.

DEMOGRAPHIC CYCLE

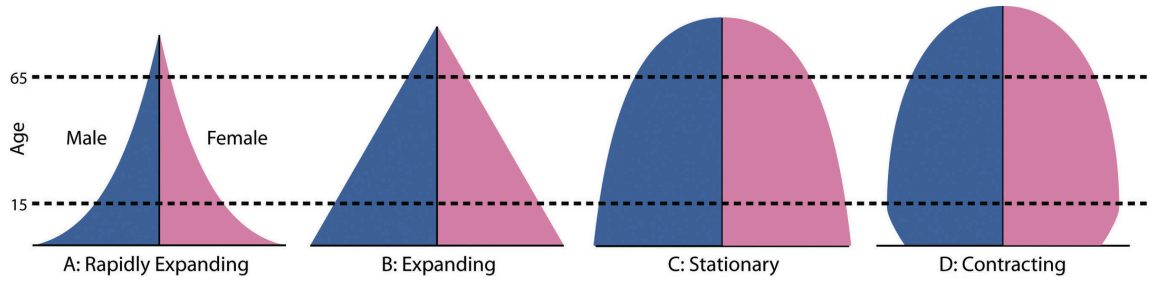


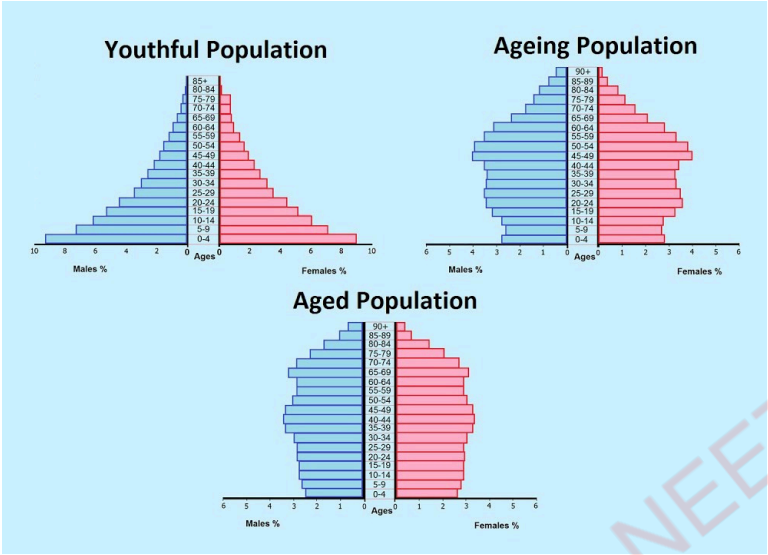
- ***Demographic gap*** = **Birth rate** - **Death rate**
- **Max** *Demographic gap* = Stage **2**
- **Min** *Demographic gap* = Stage **5**

- ***Demographic trap*** = Stage **2** *(Death rate falls, dependancy increases)*
- ***Demographic bonus*** = Stage **3** *(Birth rate falls, dependancy decreases)*

- Developing countries : Stage **1** or **2**
- Developed countries : Stage **4**
- **India :** Stage **3**

POPULATION PYRAMIDS





Important formulae in Demography

1. Crude birth rate

$$\frac{\text{No. of live births during the year}}{\text{Midyear population}} \times 1000$$

2. Crude death rate

$$\frac{\text{No. of deaths during the year}}{\text{Midyear population}} \times 1000$$

3. Annual growth rate

$$\frac{BR - DR}{10}$$

4. Dependancy ratio

$$\frac{\text{Population (<14, >65)}}{\text{Population (14 - 65)}}$$

Important formulae related to fertility

1. Gross fertility rate

$$\frac{\text{No. of live births during the year}}{\text{Midyear female population aged 15 - 49 years in the same area \& year}} \times 1000$$

2. Age specific fertility rate

***GFR** for a **specific age**.*

$$\frac{\text{No. of live births to women of age x}}{\text{No. of women of age x}} \times 1000$$

3. Total fertility rate

Summation** of **ASFR** for all **reproductive age groups**, in a **particular period

$$\sum_{age=15}^{age=49} ASFR$$

- Best indicator to check **impact of family planning program**
- Target TFR **: 2.1** ***"Hum 2 humare 2"***

4. Gross reproduction rate

***Summation** of **ASFR** for only **female child birth**.*

5. Net reproduction rate

***Estimation** of **how many girl childs will be born** to a **new born female** based on mortality rates and ASFR*

- Best indicator to check **growth of population**
- Target NRR **: 1** *(replacement level)*

6. Contraceptive Prevalence Rate (CPR)

*Percentage of women of reproductive age who are **currently using at least one contraception** method*

- Target CPR **: > 60%**

*"Formulae with **reproduction** in name are associated with **female child birth**"*

Mortality rates

1. Infant mortality rate

$$\frac{\text{Infant death}}{\text{Live births}} \times 1000$$

Infancy *: Upto* ***1 year*** *of life*

Best indicator for **health status of country**

2. U^5 mortality rate

$$\frac{U^5 \text{ death}}{\text{Live births}} \times 1000$$

Best indicator for **Social development**

All have ***live births*** *as denominator*
MMR has 1 lakh*, everything else* ***1000***

3. Neonatal mortality rate

$$\frac{\text{Neonatal death}}{\text{Live births}} \times 1000$$

Neonate *:* ***0-28 days*** *of life*

4. Peri-natal mortality rate

$$\frac{\text{Peri-natal death}}{\text{Live births}} \times 1000$$

Perinatal period *:* ***28 weeks POG*** *to* ***7 days*** *after birth*

5. Still birth rate

$$\frac{\text{Still birth}}{\text{Live births}} \times 1000$$

Still birth *: >****28 weeks POG*** *or* ***> 1000gm***

6. Maternal mortality rate

$$\frac{\text{Maternal death}}{\text{Live births}} \times 1 \text{ Lakh}$$

Still birth *: >****28 weeks POG*** *or* ***> 1000gm***

Best indicator for **Quality of healthcare services** delivery

Other Important formulae

Literacy Rate

$$\frac{>7 \text{ yrs (can read/write/understand one language)}}{\text{Population } >7 \text{ yrs}}$$

Sex Ratio

$$\frac{\text{Female}}{\text{Male}} \times 1000$$

"Female on top"

Food adultrants

Neurolathyrysm

- **Spastic paralysis of lower limbs** in adults
- Toxin: **BOAA** (*Beta oxalyl amino alanine*)
- Adulterant : **Khesari Dal** (*Lathyrus Sativus*)

- ***Toxic Bua*** *eats* ***dal***
- *Need* ***Lathi*** *to stand in* ***Lathyrysm***

Epidemic dropsy

- Non-inflammatory, **bilateral swelling of legs**, with **diarrhoea**, **cardiac failure**
- Toxin**: Sanguinarine**
- Adulterant: **Argemone Mexicana** (*oil*) in Mustard oil

- ***Drops (fluid) everywhere in dropsy***
- *The* ***songs*** *in* ***Argentina*** *and* ***Mexico*** *have the best* ***drops***

Endemic ascites

- **Ascites** and **jaundice**
- Toxin: **Pyrrolizidine alkaloids** (*Hepatotoxins*)
- Adulterant: **Crotalaria Seeds** (*Jhunjhunu*) in Millets

- ***Pyrro - Croto***

Aflatoxicosis

- **Aspergillus flavus**
- **Aflatoxin** in groundnuts, cereal, maize

- **A**flatoxin : **A**spergillus

Food standards

Indian
Food standards

Processed food
standards

International
Food standards

AGMARK
Agricultural products standards

Reference male and female

Common for both male and female

- Age : **19-39** yrs
- BMI : **18.5 - 22.9**
- Weight/height percentile : **95th**

Weight

- Male : **65** kg
- Female : **55** kg

Balanced diet

- Carbs : **55**% of total energy (**4**kcal/gm)
- Fats : **30**% of total energy (**9** kcal/gm)
- Proteins : **15** % of total energy (**4** kcal/gm)

Energy requirements for reference male/female

1. Sedentary: **2100** / **1700** kcal
2. Moderate : **2700** / **2100** kcal
3. Heavy : **3400** / **2700** kcal

21 - 27 - 34
17 - 21 - 27

- **Pregnancy***: **+350** kcal*
- **Lactation** *(0-6 months) : **+600** kcal*
- **Lactation** *(6-12months) **: +520** kcal*

Obstetrics and Neonatal Care (ONC)

PHC
ESSENTIAL ONC

1. Registration
2. ANC
3. Safe delivery
4. PNC and newborn care

CHC
BASIC EMONC

1. All **drugs**
2. Manual vaccum aspiration
3. Manual removal of placenta
4. **Newborn resuscitation**

DH
COMPREHENSIVE EMONC

1. **C-section** and other surgeries
2. **Blood transfusion**

Antenatal Visits

- WHO **: 8**
- Indian govt **: 4**
- Ideal **: 13-14**

Ideal Antenatal Visits

- **Once a month** for **7** months = 7
- **Twice a month** in **8th** month = 2
- **Once a week** for **9th** month = 4-5
- Total: **7** + **2** + **4 or 5** = **13** or **14**

Postnatal Visits

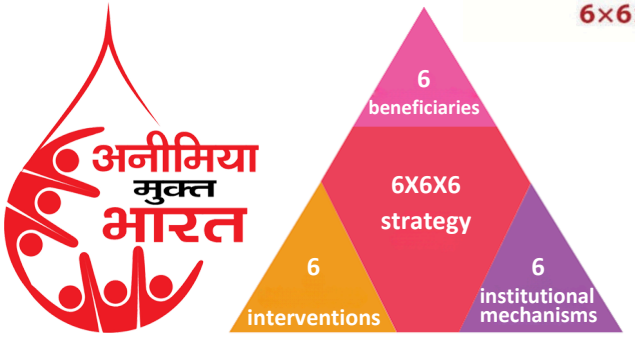
- ANM : **3-4**
- HBNC (*Aasha*) : **7**
- HBNC in **institutional** delivery **: 6**

Home based neonatal care (HBNC)

- Day **0** *(skipped in institutional del)*
- Day **3**
- Day **7, 14, 21, 28**
- Day **42**

Nutrition related programs

ANEMIA MUKT BHARAT
6×6×6 STRATEGY



1. Prophylactic **IFA** tablets
2. **Deworming**
3. Anemia **testing**
4. **Iron fortified food** in public health programmes
5. Establishing **year round behaviour** that prevents anemia (eg. *delayed cord clamping*)
6. Addressing **non nutritional causes** of iron def. such as malaria, haemoglobinopathies and fluorosis.

	Fe	Folate	Frequency
6-59m	20mg	100µg	Bi-weekly syrup
5-9y	45mg	400µg	Weekly
10-19y	60mg	500µg	Weekly
20-49 Females			Weekly
Pregnant			OD
Lactating			OD

ICDS
INTEGRATED CHILD DEVELOPMENT SERVICES

Ministry of Woman and child development

BENEFICIARIES

- **Child** : 0-6 yrs
- 10-18yr **adolescent girls**
- 15-49yr **ovulating females**
- **Pregnant, lactating** females

PM POshan SHAkti Nirman

Ministry of education

Mid Day Meal Scheme

BENEFICIARIES

1. Government **primary** and **upper primary** schools
2. **Govt. aided** *Madarsas* and *maqtabs*

POSHAN Abhiyaan

PM's Overarching scheme for Holistic Nourishment

सही पोषण - देश रोशन

Ministry of woman and child development

- **National nutrition mission**
- Adresses "**SULA**"

Stunting
Underweight
LBW
} **<2% per year**

Anemia → **<3% per year**

Provides

- **1/3** of daily **calorie** requrement
- **1/2** of daily **protein** requirement

VILLAGE HEALTH NUTRITION DAY (VHND)

- Conducted **once a month**
- At **anganwadi** centres
- Villagers **interact with health workers**

Maternal and Newborn Health Programs

JANANI SURAKSHA YOJNA

- **Cash assistance** with **delivery** and **post-delivery care**.
- For pregnant women **going to a public health institution** for delivery, entire cash entitlement is to be disbursed to her in one go, at the health institution

JANANI SISHU SURAKSHA KARYAKRAM (JSSK)

- **Mother** and **newborn** care *(upto 1 yr)*
- **Ambulance services** from home and also for referral
- Free delivery, drugs, diagnostics.

LABOUR ROOM QUALITY IMPROVEMENT INITIATIVE guidelines

- **To improve quality of care in labour room**
- To reduce *preventable* **maternal and new-born mortality**, **morbidity** and **stillbirths**.

- **Mother and Child Protection Card** along with **Safe Motherhood Booklet**
- **ANC for all pregnant women** in their second or third trimester by a physician/specialist on **9th of every month** (in govt and private institutions)
- Identification of medical conditions and **color coding**
  - **Green :** No risk factor
  - **Red :** High risk pregnancy
  - **Yellow :** Diabetic, hypothyroid, STDs
  - **Blue :** PIH

Post natal care till 6 months
Suman - Six

Child and Adolescent Health Programs

Rashtriya Bal Swasthya Karyakram

- Till **18yrs** of age
- **Health Screening** and **Early Intervention** services
- **4 "D"** : **D**efect, **D**eficiency, **D**isease, **D**evelopment delay
- In deficiencies : Vit C and Vit K not included

no CK in SK

Early screening → **Referral** → **Free of cost management**

Rashtriya Kishor Swasthya Karyakram

- Health Programme for **adolescents**
- Age **10-19 years**
- Target their **nutrition**, **reproductive health** & **substance abuse**, among other issues.

Saathiya Salah app
Launched under RKSK

Other Government Health Programs

National TB elimination program

- World TB Day : **24th March**
- 2024 theme : ***Yes ! We can end TB***

NTEP targets

- **90%** redñ in TB death
- **80%** redñ in TB incidence
- **Reduce catastrophic cost to 0** by 2025

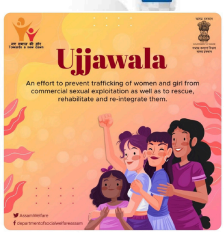
Akshya :
Improve access to quality TB care

National Leprsoy eradication program

- **Nikushth :** Online portal for Leprosy pt.
- **Nikshay** : Online portal for TB
- **Nischay** : Urine pregnancy test

UJALA

Unnat Jyoti by Affordable LEDs For All



Ujala : 20 W LED bulbs

Ujjwala : Safer fuel

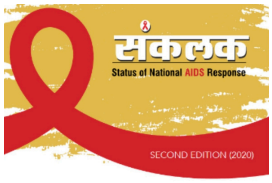
Ujja-wala : Human trafficking

NACO

National AIDS Control Organisation
India's Voice against AIDS
Ministry of Health & Family Welfare, Government of India
www.naco.gov.in

NACO Target 90% for

- Diagnosed
- Treated
- Virally suppressed
- Improved quality of life



Sankalk

- NACO's **annual booklet**
- Publishes national AIDS response status

NATIONAL IODINE DEF. DISORDER CONTROL PROGRAM

Targets

- **Survey and reduction** of goitre
- **Iodine fortified** in salt

Consumer level >**15ppm**
Manufacture level >**30ppm**

MENTAL HEALTH ACT 2017

NATIONAL MENTAL HEALTH PROGRAM

- **Decriminalisation of suicide**
- Child **< 3 years not be separated** from mentally ill mother
- **Free treatment** for mental illness
- **Fair treatment** to mentally ill
- **Advance directive** for t/t and nominees.

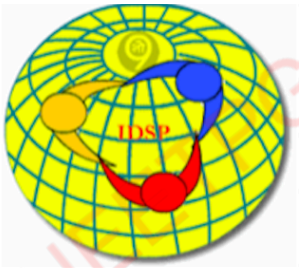
NATIONAL VECTOR BORNE DISEASE CONTROL PROGRAM

NVBDCP

6 diseases covered

Anopheles	Aedes	Culex	Sandfly
• Malaria • Filariasis	• Dengue • Chikun.	• JE	• Kala Azar

INTEGRATED DISEASE SURVEILLANCE PROGRAM



- **Early detection and response to outbreaks**
- Strengthen **laboratories**
- Strengthen technology to **collect and process data**

PRADHAN MANTRI (PM) JAN AROGYA YOJNA (JAY)

Pradhan Mantri Jan Arogya Yojana
Ayushman Bharat
PM-JAY

- **5 lakh** insurance
- **Cashless treatment** in govt/private hospitals
- **No limit on age/members/ type of illness**

National Initiatives for improving Quality of Public Health Facilities

KAYAKALP PROGRAM

KAYAKALP कायाकल्प
Rejuvenating Public Healthcare Facilities

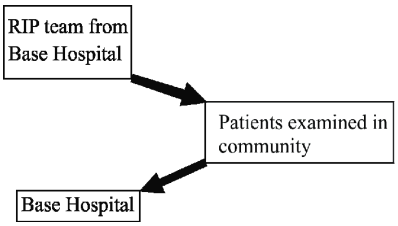
Promote **cleanliness, hygiene** and **infection control** in **health care facilities.**

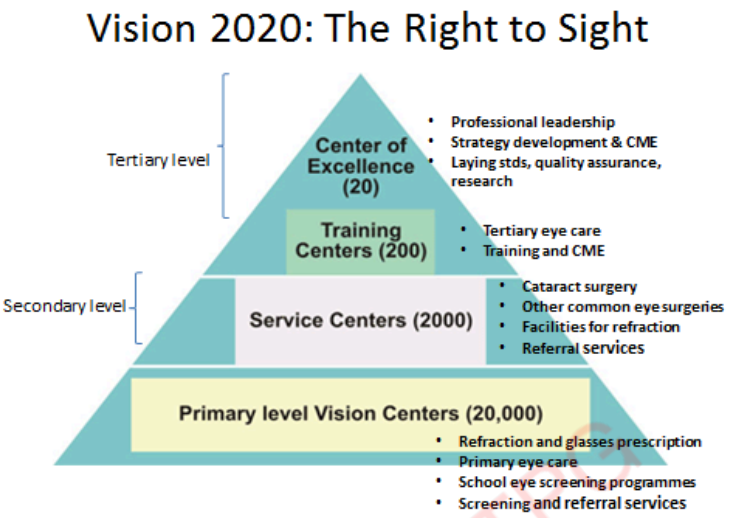
NATIONAL QUALITY ASSURANCE SCHEME

NQAS

NATIONAL PROGRAMME FOR CONTOL OF BLINDNESS AND VISUAL IMPAIRMENT

- **Blindness : <3/60** in better eye
  can't see 360
- **Aim of NVBDCP :** Blindness **<0.3 %**
- **Measure of output :** Successful *cataract surgeries* causing **vision restoration**
- **Reach in approach :**





NITI AAYOG

- National Institution for Transforming India Aayog.
- Formed in 1st Jan. 2015.
- Government of India policy.
- Head Quarter – New Delhi.
- Established by Prime Minister Narendra Modi after having dissolved the Planning Commission.
- Aim - to foster involvement and participation in the economic policy-making process by state governments of India.
- **Chairperson-** Prime Minister NARENDRA MODI

VANDE MATARAM SCHEME

- **Safe motherhood services**
- Included under **JSY**

suraksha clinic
Sexual and Reproductive Health Services

Chlorination of water for disinfection

$Cl^2 + H^2O$ **HClO + HCl**

- *Disinfecting action* **: Hypochlorous acid** (HClO)
- Contact period needed : **1 hour** *of residual chlorine*

- **Breakpoint chlorination** : chlorine demand of water is met
- Chlorine added after breakpoint chlorination is *residual chlorine*

Residual chlorine level needed

- *Drinking :* **0.5 ppm**
- *Post disaster :* **0.7 ppm**
- *Swimming pools :* ***1 ppm***

Chloroscope
Measures residual chlorine

Ortho-toluidine test
Free + Combined Chlorine

*t**O**luidine : t**O**tal chlorine*

Horrock's Apparatus
Measures chlorine demand

- **6 white cups** (water) and **1 black cup** (contains chlorine)
- Chlorine is added, *1 drop in 1st, 2 drops in 2nd and so on*
- **Residual chlorine** reacts with **starch iodide** to give blue color.
- Number of cup showing blue colur : **n**

Chlorine demand = (**n** ×**2g**) for **455L** of water

Water contamination

- **Recent** contamination **: Fecal streptococci**
- **Remote** contamination : **C. Perfringens** *(has capsule, hence resistant)*
- Best test to confirm fecal contamination : Detect **coliforms** (E-coli)
- **Multiple tube method** used to detect coliforms.
- In **drinking water** coliform count should be **Zero**
- Most **undesirable metal** in water **: Lead**

Fluorosis

- **< 0.5** : Dental **cavities**
- **1.5** : **Dental** fluorosis ***dedh - daant***
- **3** : **Skeletal** fluorosis
- **10** : **Crippling** Fluorosis ***Give ₹10 to a cripple***

Nalgonda technique for removal of fluoride

Diseases related to water

- Water **borne** : Feco oral transmission (*Diarrhea, Typhoid*)
- Water **based** : Vector stays in water (*Schistosomiasis, dracunculiasis*)
- Water **related** : Vectors born in water (***NVBDCP diseases***)
- Water **washed** : With inadequate water causing poor hygiene (Trachoma, Scabies)

Water required per capita

- In urban : **150-200** Lt
- In rural : **40** Lt

Hardness of water

- Temporary hardness : **HCO^3** of **Ca/Mg** (*escapes off as CO^2*)
- Permanent hardness : **Sulphate** / **Chlorides** / **Nitrates** of **Ca/Mg**
- **Max** hardness level **: 150 ppm**

Some hardness is needed in water
Zero hardness makes water corrosive

Treatment of hard water
- **Boiling** and **lime** removes *temporary hardness*
- **Soda ash**, **base exchange resins** remove *permanent hardness*

Air

Katta thermometer
- Initially designed for *cooling power of air*
- Now used to measure **low air velocity**

Globe thermometer
Radiant temparature

Anemo-meter
Wind velocity

Wind Vane
Wind direction

AIR POLLUTION

- **Sulphur dioxide** is best indicator of air pollution
- **Biological** air pollution indicator : **Lichen**
- Levels of CO^2 in air *don't indicate pollution*
- **Tropspheric Ozone** (*ground-level ozone*) is a **secondary** air pollutant
- Maximum green house effect **: Water vapour > CO^2**

- **Soiling index** : Smoke *(air passed through thin paper that gets "soiled")*
- **Grit index** : Dust

Lichen
*(symbiosis of **algae** and **cyanobacteria**)*

Baro-meter
Air pressure

Sling thermometer
(Psychrometer)
Measure humidity

AQI	Remark	Color Code
0-50	Good	
51-100	Satisfactory	
101-200	Moderate	
201-300	Poor	
301-400	Very Poor	
401-500	Severe	

CPCB Air standards

- **AQI** (*air quality index*) is used
- Delhi : **Severe** (400)

Light, Sound and Miscellaneous

- Luminous intensity (*brightness*) : **Candela**
- Rate of light emission (*flux*) **: Lumen**
- Total light on surface (*illuminance*) : **Lux**

Luminous candle

Lux soap on skin SURFACE

- Tolerable sound level : < **90** db
- TM rupture : **150** db

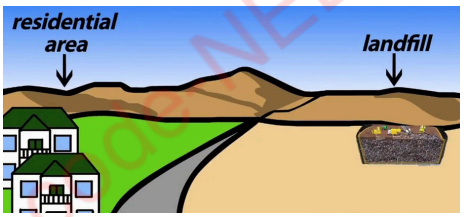
- Per capita space in house: **80 sqft**
- Doors + Windows : **2/3** of total floor area

150 compiled

1. Max hardness of water : **150 ppm**
2. Water per capita in urban area : **150 -200 L**
3. TM rupture : **150 db**
4. RDA of Iodine in adults **: 150 mcg** (*250 in preg*)

SANITARY LANDFILL

- aka Controlled tipping
- **Best method** for *solid waste disposal*
- Uses either *Trench/Ramp/Area* method
- **Area requirement** *: 1 acre for 10,000 people*



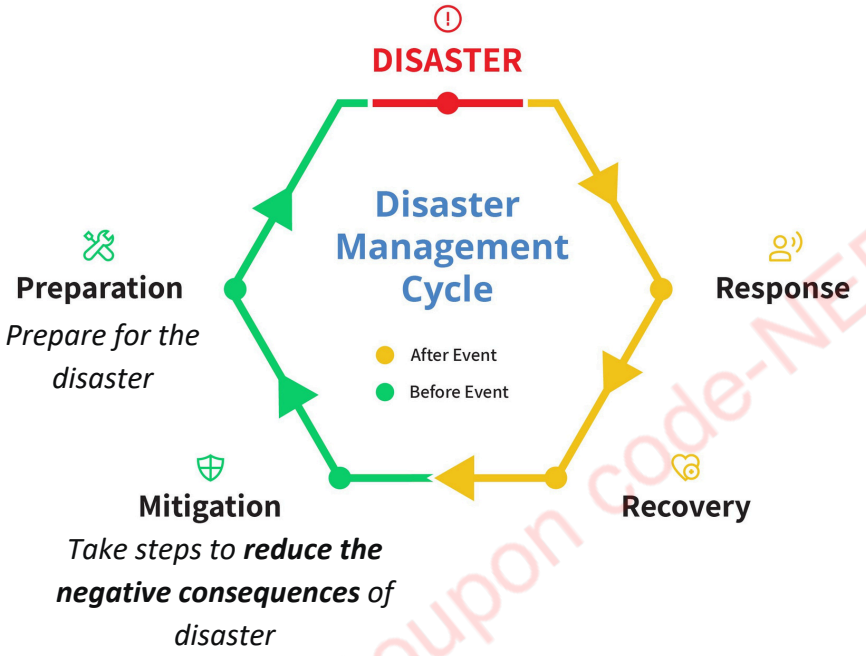
Occupational diseases

1. **Bysinnosis**: Cotton dust (Monday chest tightness)
2. **Baggasosis** : Sugarcane (*thermoactinomyces sacchari*)
3. **Anthracosis** : Coal (can lead to massive pulmonary fibrosis)
4. **Silicosis** : TB/ most common / mcc of disability / mcc of death (amongst occ. disease)
5. **Asbestosis** : Lung cancer, mesothelioma (base of lung)

Health Communication

- One-way talk : **Lecture**
- Talks series by experts with Q and A : **Symposium** ***Series of talks***
- 4-8 experts in front of audience with Q and A : **Panel discussion** ***Expert panel***
- 6-12 people (*not experts*) discussing : **Focused group discussion**
- Practical skills teaching : **Workshop**
- Step by step enactment : **Demonstration**
- Photograph pasting : **Flannel graphs** (*flannel* : Khaddi), "Pictures pasted on a stretched piece of Khaddi"

Disaster management



- MC disease : **Gastro-enteritis**
- MC vitamin deficiency **: Vitamin A** *(fat absorption affected in GI disorders)*
- MC zoonotic disease : **Leptospirosis**
- Vaccines to health workers **: Typhoid/ Cholera/ hepB**
- Only vaccine which can be given in outbreak **: Measles**
- Most crucial preliminary step : **Chlorination of water**
- Nodal ministry **: Ministry of Home affairs**

Protocols

- **CAGE** : Alcohol
- **Stop BANG** : OSA (***Stop bang fat***)
- **INSPIRE**: Child abuse (***Inspired to not abuse children***)
- **Spikes** : Bad news (***yikes***)
- **Gather** : Contraceptive plan, **Cafeteria** approach (***gather contraceptive in cafeteria***)
- **Scoff** : Eating disorders *(Scoff : To eat something hurriedly*)

PHC

Components of PHC *"ACE I"*

1. **Appropriate tech** (Shakir tape, vaccines)
2. **Community participation** (AASHA workers)
3. **Equitable distribution**
4. **Inter-sectoral coordination**

4 essential As of healthcare

1. Available
2. Accessible
3. Affordable
4. Acceptable

Elements of PHC

- **Basic treatment**
- **Drug** availability
- **Maternal and child** health
- **Vaccination** (*immunisation*)
- Prevention of **endemic** diseases
- **Nutrition**
- **Sanitation**
- **Education**

Planning cycle

1. **Analyse the health situation** : *How much do I know*?
2. Set **objective** and **goals** : *NEET PG 2025*
3. **Assessment of resources** : *Marrow, Cerebellum, Prepladder, BTR*
4. **Prioritise** : *BTR*
5. Formulate a **plan** : *Follow Mam's plan*
6. Program and **implement** : *Start studying*
7. **Monitor** : *Grand tests*
8. **Evaluate** : *GT Review*

Community Health Centre (CHC)

- A **30 bedded** Hospital
- Referral unit for **4** PHCs

Primary Health Centre (PHC)

- Referral unit for **4-6 SC**
- **4-6** bedded
- **MO in - charge**
- **14 paramedical staff**

Sub Centre (SC)

- Most peripheral contact point of community with Primary Health Care system;
- **One MPW**(M) and **MPW**(F)

Village Level

- Village level appointed health workers
- **ASHA**, **Anganwadi**, **Dai**, **local health worker**

Acts - Ministry of Labour

Employees' State Insurance (ESI) act -1948

1. Sickness benefit

- **70%** salary for **3** months *7+3=10*

2. **Extended sickness benefit** *(extended time)*

- **80%** salary for **2** years *8+2=10*

3. **Enhanced sickness benefit** *(Enhance : body modification)*

- **Full wage** for **1** week in **vasectomy** *1 tube 1 week*
- **Full wage** for **2** weeks in **tubecomy** *2 tubes 2 weeks*

Split of premium

- **4**% of salary
- Employee pays **0.75** %
- Employer pays **3.25** %

Split of coverage

- Government pays **: 1/8**
- ESI pays **: 7/8**

Maternity benefit **: 6 months 100**% pay
Funeral benefit : ₹ **15,000**

Factory act -1948

- Age **< 14** years not allowed
- **500 ft³** per capita space
- For **1000** workers 1 safety officer
- **48 hours** per week

Factory act **not applicable** to

- Defence
- Mining
- Railway
- Eateries

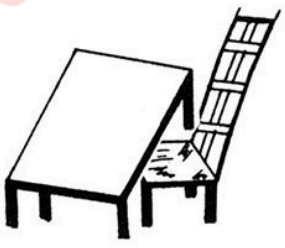
ESI **not applicable** to

- Defence
- Mining
- Railway

School health

- 1 class : **40** students
- Each child >**10 sqft** space
- 1 urinal for **60 kids**
- 1 latrine for **100 kids**
- Door and windows, **25 percent of floor area**
- **Minus type** desks

Class of 40, 60 pee, 100 poop



Minus Desk
(Chair pulled
into table)

Large windows