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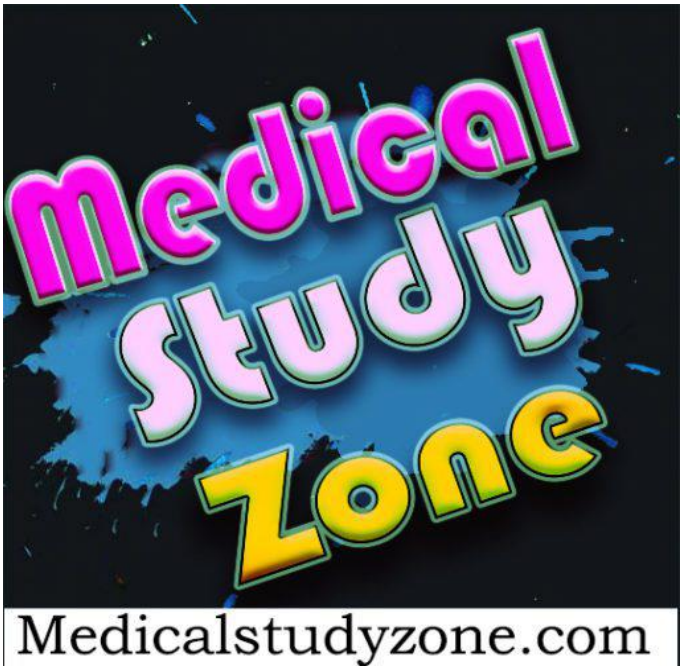
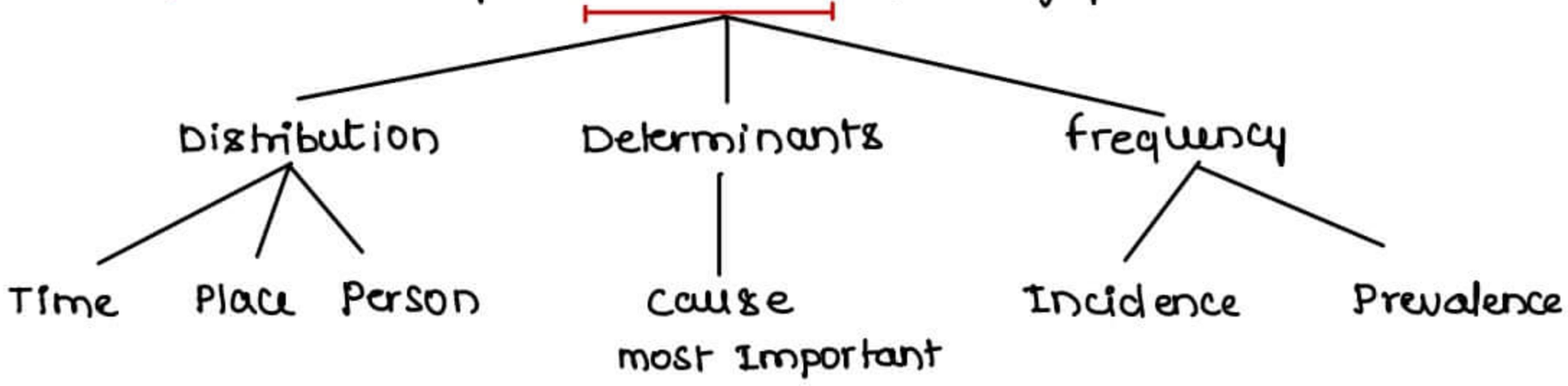


EPIDEMIOLOGY → Among People Study

→ Defination → Study of Diseases in a population



– Defined by John M. Last

DISTRIBUTION

TIME / SEASONAL DISTRIBUTION

			Season		Vector
1.	Malaria	→	Rainy	→	Anopheles
2.	Dengue	→	Rainy	→	Aedes aegypti [Tiger Mosquito]
3.	Typhoid	}	Rainy		
4.	Cholera	}			
5.	Polio	→	Rainy		
6.	Rotaviral	→	Winter		
	Respiratory Infections				
7.	Measles	}	Winters		
8.	Mumps	}			
9.	Rubella	}			
10.	Chicken pox	}	the Droplet size that transmits most efficiently → < 5 μ		
11.	H_1N_1	}	Inter personal distance where transmission is max → < 1 metre		
12.	Diphtheria	}	[Try to maintain an arm length from patients in OPD]		
13.	Pertussis	}			
14.	DM	}	No seasonal distribution for commonly occuring non-Communicable diseases		
15.	HTN	}			
16.	CHD	}			
17.	Cancers	}			
18.	RTA	→	Winter, Rainy		
19.	HIV	→	No seasonal Distribution		
20.	Hay fever	→	Spring, Winter [Pollen, Dust]		
21.	Asthma	→	Winter		

PLACE DISTRIBUTION → Geographical Distribut^{n}

		PLACE		VECTOR
1.	Kala Azar →	UP, WB, Bihar, Jharkhand	→	Phlebotomus [sand fly]
2.	Japanese encaphalitis →	UP, WB	→	Culex Tritenio rhyncus C. vishnuii C. Gelidus
3.	KFD →	Kyasanur forest [karnataka]	→	Hard Tick [Hemophysalis spinigera]
4.	Malaria →	East & North East India	→	Anopheles
5.	Filariasis →	Costal Regions of India	→	Culex quinquefasciatus [c. fatigans]
6.	Fluorosis →	Central & western India		
7.	HIV →	High Prevalence states [7] Tamilnadu, Karnataka, Andhra Pradesh Maharastra, Nagaland, Manipal, Mizoram Moderate Prevalence States [3] Gujarat, Goa, Pondicherry Low Prevalence states All other parts of India Max reported in world South Africa, Nigeria, India		
8.	DM →	1. China 2. India		

New Diseases

India [Emerging/ Reemerging]

H_1N_1 [swine flu]	→	Metros		
Congo fever	→	Gujarat, Delhi	→	Hyaloma Hard ticks
Litchi Virus Disease	→	West Bengal	→	dlt MCG
Ebola Virus	→	Delhi	→	dlt Body Fluids
Zika Virus	→	Gujarat, Tamilnadu	→	Aedes
Plasmodium Ovale	→	Gujarat, WB, Delhi, Mumbai		
NIPAH Virus	→	WB, Kerala	→	fruits & Bat secretions
WEST NILE FEVER	→	Kerala		

NEW DISEASES

WORLD

- H_1N_1 → Mexico, South Asia
- H_5N_1 [Bird Flu] → Hongkong, South Asia, ~~India~~
- H_7N_9 → China [2013]
- MERS [Resp. syn.] (middle east) → Middle East countries

SARS & MERS by corona virus → MERS-COV

- Ebola → Africa
- Zika → Africa

PERSON DISTRIBUTION

Age Distribution

- Measles → 6 months – 3 yrs
- Mumps → 5 – 9 yrs [School going Age]
- Chicken Pox → 5 – 9 yrs [School going Age]
- H_1N_1 → No Age Distribut^n
- Rheumatic fever → 5 – 15 yrs
- Typhoid / Cholera → No Age Distribution
- Rota virus → Younger Infants
- Neonatal Tetanus → Neonates
- Polio → 0 – 5 yrs
- DM → > 40 yrs
- HTN → > 40 yrs
- CHD → > 40 yrs
- Cancers → > 50 yrs
- Cataracts → > 50 yrs

Age Groups

- Child → 0 – 18 yrs
- Adolescent → 10 – 19 yrs
  - → 10 – 13 yrs [early]
  - → 14 – 16 yrs [mid]
  - → 17 – 19 yrs [Late]
- Reproductive Age group → 15 – 49 yrs
- Geriatrics → > 60 yrs
- Perinatal Period → 28 WKS POG till 7 days post delivery
- Period of viability → POG > 28 WKS (OR) BW > 1000 gms (OR) BL > 35 cm
  - Abortion → POG < 28 WKS (OR) BW < 1000 gms (OR) BL < 35 cm
  - Still Birth → POG > 28 WKS (OR) BW > 1000 gms (OR) BL > 35 cm

- BW is most sensitive

HUMAN POVERTY INDEX

→ Earlier categories HPI 1 [for Developing countries]; HPI 2 [for developed countries]

→ NOW → MDPI [Multi Dimensional Poverty Index]

MDPI

components

INDICATORS	SUB INDICATORS
a. Health	Child mortality
	Nutrition
b. Educatⁿ	Years of schooling
	School attendance
c. Living Standards	Fuel
	Water
	Electricity
	Toilet
	Floor
	Assets

Range → $0 < MDPI < +1$

INDIA → 0.121 [27.5% poor]

INTERPRETATⁿ

20 – 33.33% → vulnerable to poverty

> 33.33% → Poverty

> 50% → Severe Poverty

Overall → Deprivatⁿ in > 1/3 is POVERTY

BPI [Below Poverty Line]

1. Coloric Intake
   - Rural → < 2400 K.cal / Day *
   - Urban → < 2100 K.cal / Day *

2. Income Per Capita

	Tendulkar committee 2011-12	Rangarajan committe 2013-14
– Rural	< 27/- per day	< 32/- per day
– Urban	< 33/- per day	< 47/- per day
	– 22% BPL	– 29.5% BPL

COHORT STUDY	CASE CONTROL STUDY
→ Forward	→ Backward
→ Prospective	→ Retrospective
100 Smokers → Lung Cancer	Smoking ← 100 Lung Cancers
2020 → 2035	2005 ← 2020
→ Cause → Effect	→ Cause ← Effect
Exposure → Outcome	Exposure ← Outcome
Risk factor → Disease	Risk factor ← Disease

COHORT STUDY

	Exposed	Non-Exposed
→ 2020	100 smokers	→ 100 Non smokers
	↓	↓
2035	80 Lung cancers	10 Lung cancers

- Golden rule of Epidemiology → Always take comparision

→ 2 groups → Exposed, Non Exposed } & we wait for occurence of same disease in both groups & then compare

→ Results calculated by → STRENGHTH OF ASSOCIATION

Strength of Association is given by

1. Relative Risk
2. Attributable Risk
3. Population Attributable Risk

Relative Risk

→

$$RR \rightarrow \frac{I_e}{I_{ne}}$$

I_e → Incidence in exposed

I_{ne} → Incidence in non exposed

$$RR \rightarrow \frac{80/100}{10/100} \rightarrow 8$$

→ implies, Smokers are relatively 8 times higher risk of Lung cancer as compared to Non-Smokers

→ RR ≅ Risk Ratio → Ratio of developing Lung cancer b/w smokers and Non smokers → 8:1

→ RR > 1 → Associat^{n} present
RR = 1 → No Association
RR < 1 → Negative / Inverse Association → Risk factor is protective

Attributable Risk [AR] / Excess Risk / Absoluti Risk / Risk Difference

→

$$AR \longrightarrow \frac{Ie - Ine}{Ie} \times 100 \longrightarrow \frac{80/100 - 10/100}{80/100} \times 100 \longrightarrow 88\%$$

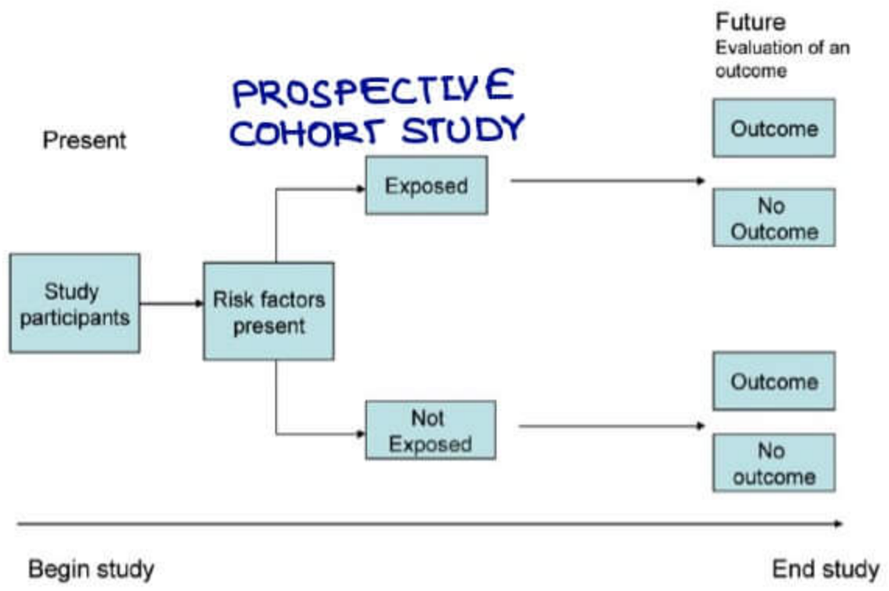
→ Interpretation → 88% of Lung cancer can be attributed to smoking

Population Attributale Risk [PAR]

→

$$PAR \longrightarrow \frac{I_{Total} - I_{ne}}{I_{Total}} \times 100 \longrightarrow \frac{90/200 - 10/100}{90/200} \times 100 \longrightarrow 77\%$$

→ Interpretation → If smoking is eliminated from the same population then there will be a 77% reduction of new cases/ Incidunce of Lung cancer every year in the same population



Clinician mainly concerned with → Relative Risk
Epidumiologist concerned with → Attributable Risk
PH Programme Manager concerned with → Populat^{n} Attributable Risk

COHORT STUDY

→ forward looking study
→ Prospective study
→ cause to Effect study
→ Risk factor to Disease study
→ Exposure to outcome study
→ follow up study
→ Incidence study

FRAMINGHAM HEART STUDY

→ Most popular cohort study
→ for CAD [Coronary Artery Disease]
→ in 1948, USA
→ made a list of Risk factors
→ Age group → 30-62yrs
→ Sample size → 4469 → Divided in to exposed & non exposed groups
→ Checking of Incidence of CHD every 2 yrs
→ Framingham → Town in USA
→ Type of COHORT Study

→ Cohort defined as Group of Individuals having same Characteristic
→ minimum no. of cohorts required in a Cohort study → 02

CASE CONTROL STUDY & COMBINED DESIGNS

CASE CONTROL STUDY

2005 → 70 Smokers ← History
2020 → 100 Lung cancers [diseased] ← CASES

10 Smokers ← History
100 Healthy People [Non Diseased] ← CONTROLS

→ 2 groups (cases, controls) } & we ask history of same exposure in both the groups & then compare

Strength of Association → Given by ODD's Ratio / CROSS PRODUCT RATIO

→ Odd's Ratio → $\frac{ad}{bc}$

→ $\frac{70 \times 90}{10 \times 30}$

→ 21

History \ Disease	Present	Absent
Present	a = 70	b = 10
Absent	c = 30	d = 90
	a+c	b+d
	Cases	Controls
	100	100

→ Interpretation
- OR > 1 → Association Present
- OR = 1 → No Associatⁿ
- OR < 1 → Inverse / Negative Associatⁿ → Rf is protective

→ Lung cancer cases have 21 times more chance of reporting History of smoking as compared to healthy people in the study

Case control Study

→ Backward looking study
→ Retrospective study
→ Effect to cause Study
→ Disease to Risk factor study
→ Outcome to exposure study

→ TROHOC study
→ case refrence study

	Case	control
→ Ideal Ratio for Good case control Study	→ 1	: 4
minimum ratio for Case control Study	→ 1	: 1

COHORT STUDY	CASE CONTROL STUDY
→ Time consuming study	→ Quicker study
→ Expensive study	→ Cheaper study
→ Incidence, RR [more accurate]	→ Odd's Ratio
→ No Recall Bias	→ Recall Bias + nt
→ Loss to follow up [Attrition] • Max allowable attrition Rate < 5% • Ideal retent^n rate ≥ 95%	→ No loss to follow up
→ HAWTHORN BIAS - Study subjects alter their behavior bout notice	→ NO Hawthorn Bias
→ Ethical Problems present	→ NO Ethical problems
→ Not useful for rare diseases	→ useful for Rare diseases
→ multiple OUTCOMES can be studied together	→ multiple RISK FACTORS can be studied together

➡ Cohort Study is Best Study than Case control study → b/c most accurate

Cohort Study

Smoking ⟶ Lung CA
2020 2035

Incidence, RR

RETROSPECTIVE COHORT STUDY [combinat^n of both]

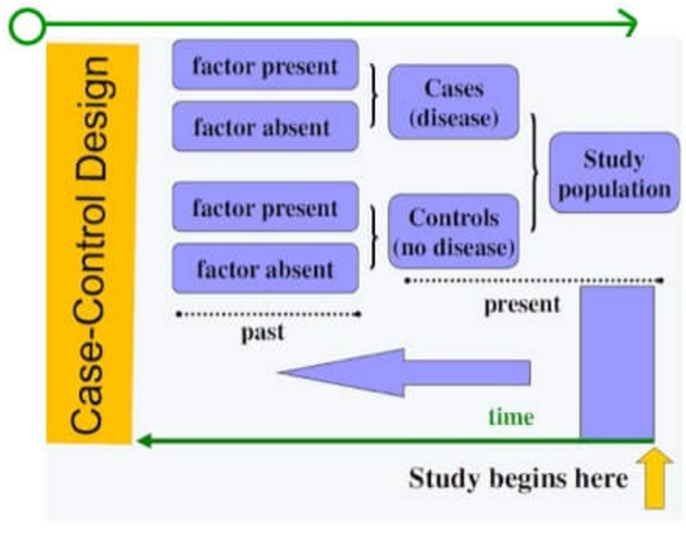
Smokers ⟶ Lung CA
2005 2020

Incidence, RR, saves time

Case Control Study

Smoking ⟵ Lung CA
2005 2020

ODD's Ratio



MIXED COHORT STUDY

→ combinat^{n} of both retrospective & prospective cohort study

Smokers (2005) —RC→ Lung CA (2020) —PC→ Lung CA (2030)

Alcoholics (2020) ⟶ CHD (2040) ⟶ Prospective cohort study

Alcoholism (2000) ⟵ CHD (2020) ⟶ Case control study

Alcoholism (2000) ⟶ CHD (2020) ⟶ Retrospective cohort study

Alcoholics (2000) ⟶ CHD (2020) ⟶ CHD (2025) ⟶ Mixed cohort study

NESTED CASE CONTROL STUDY

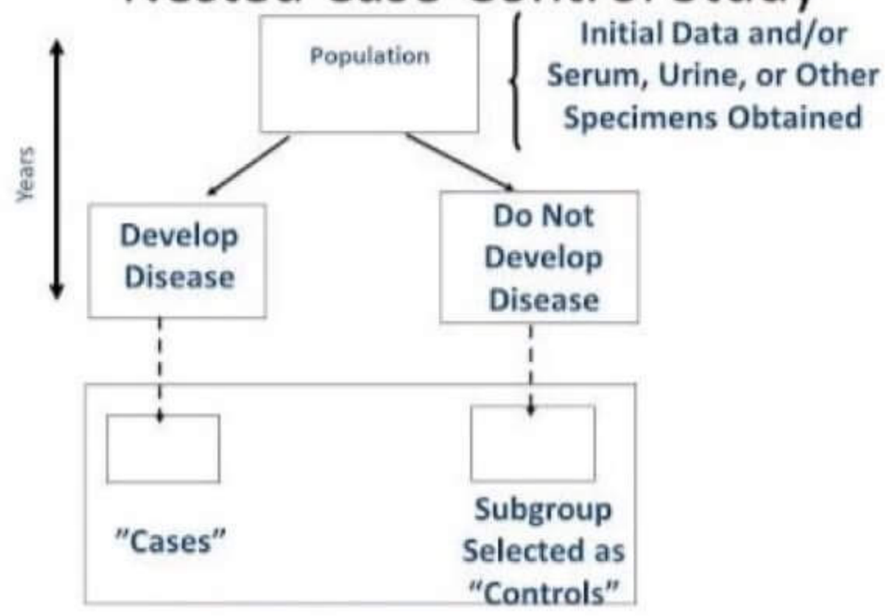
→ Type of cohort study

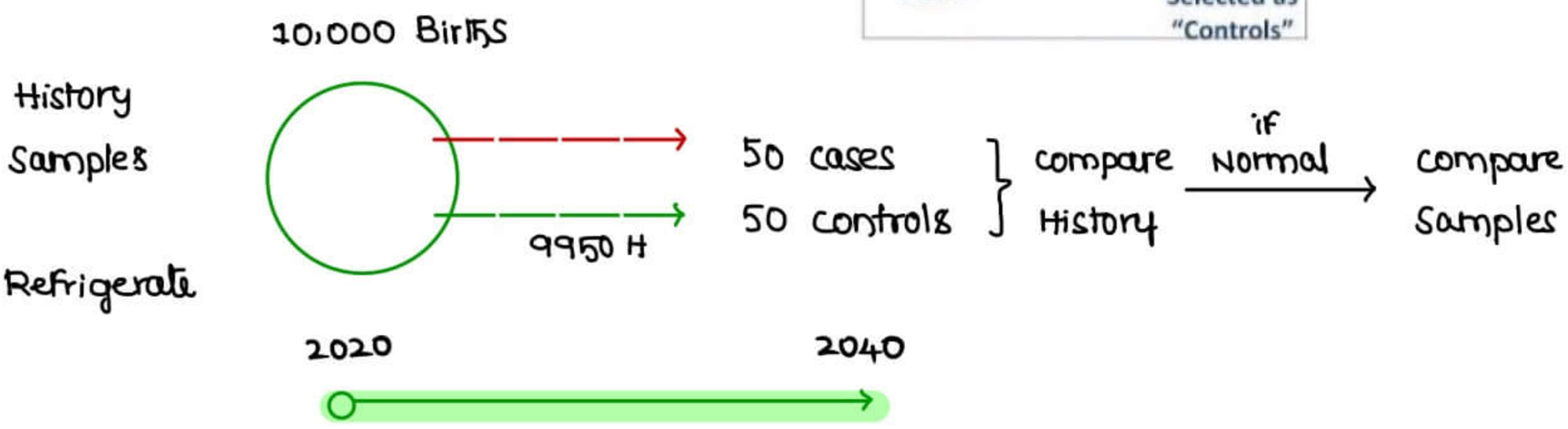
→ Temporality → forward looking study

→ Only done if

1. Disease New & Rare
2. Diagnostic tests very Expensive

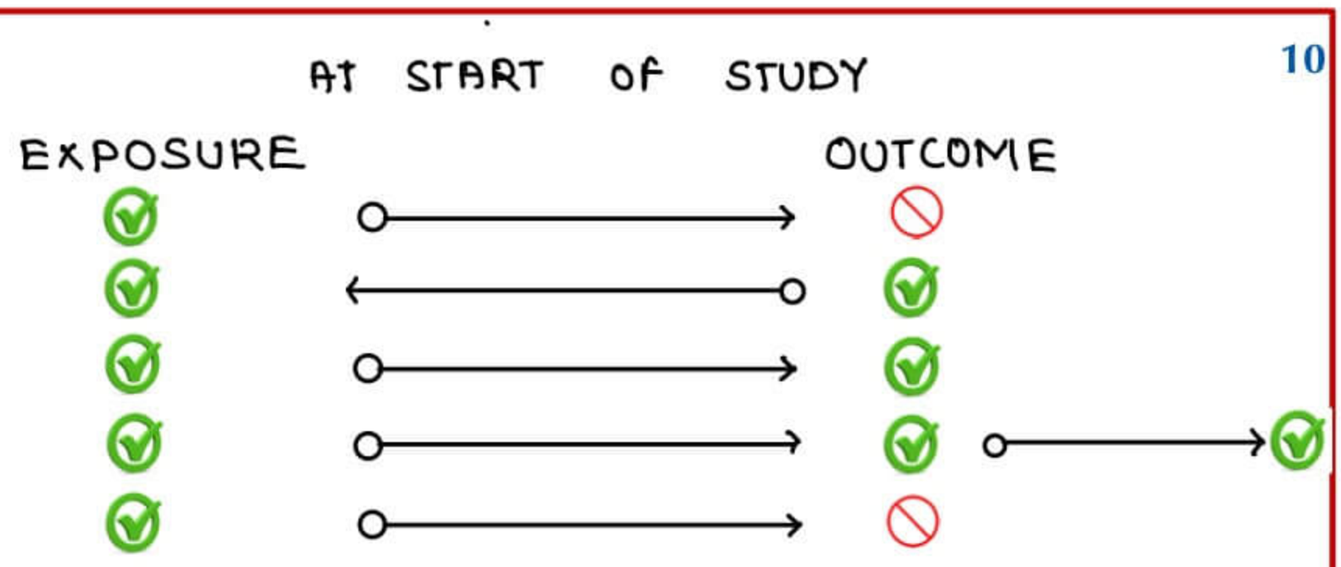
→ Eg → Stem cell Banking

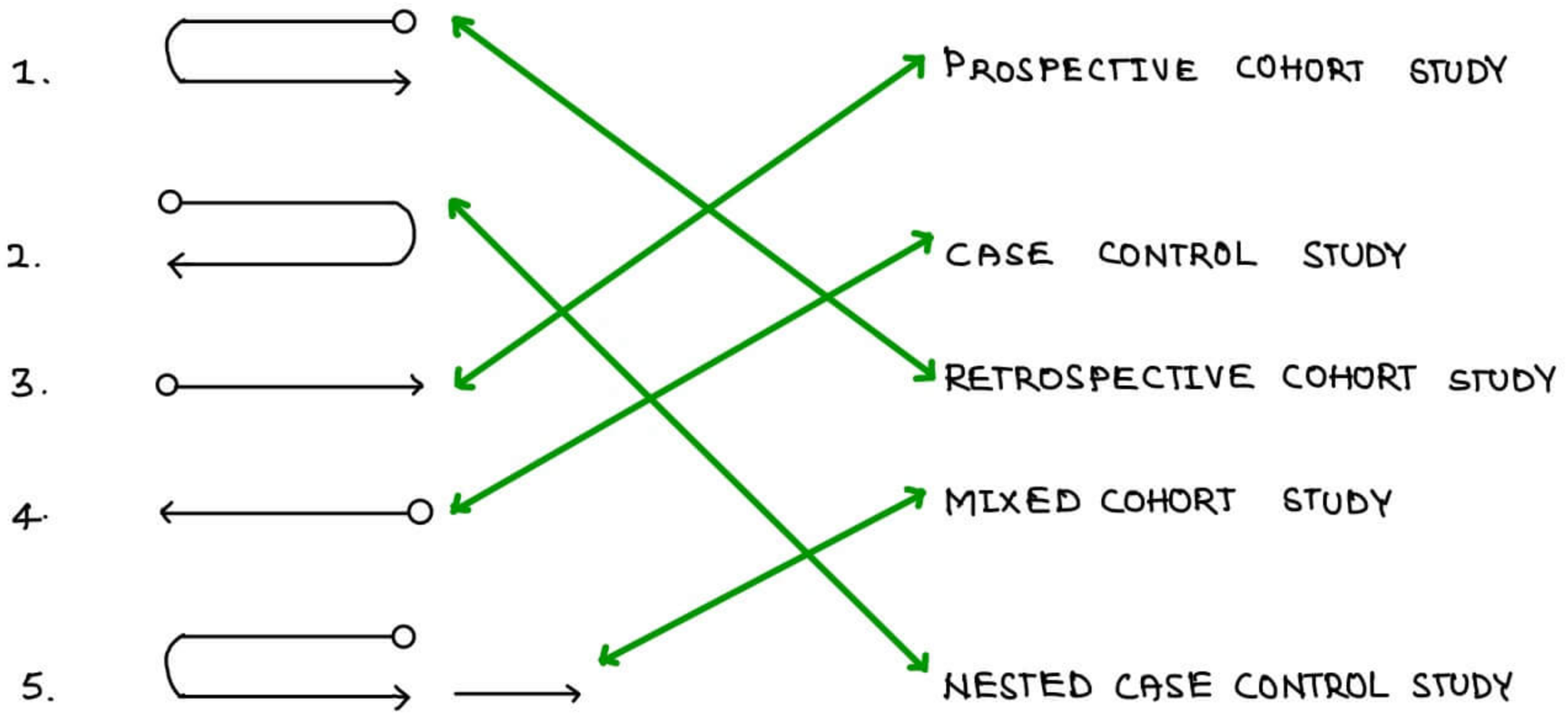




→ A Nested case control study is a small case control study which is nested in a Big cohort study

Prospective cohort Study
Case control Study
Retrospective cohort Study
Mixed cohort
Nested case control Study





Retrospective cohort study	> Prospective cohort study	> Case control study
Incidence	Incidence	Odd's Ratio
Relative Risk	Relative Risk	
Saves time		

OTHER ANALYTICAL STUDIES

CROSS SECTIONAL STUDY / SNAPSHOT STUDY / PREVALENCE STUDY

→ Done at At a point time, neither forward or backward
→ Eg.

2020
smokers → 26%.
Lung CA → 01%.

→ Can't calculate Strength of anociatn
→ Gives Prevalence
→ Based on primary data [Investigator collects data himself]

ECOLOGICAL STUDY / CO-RELATIONAL STUDY

→ Done at a point of time
→ Used in Nutritional surveys
Eg → Avg. fat intake = 20gm/day
→ Can't calculate Strength of Associatn or Prevalence
→ Based on secondary data [collected by some one else, Studied by investigator]

RCT > RCS > PCS > CC > CS > E

UNIT OF STUDY

→ Results of Study Applicable on

→ cohort, case control, cross sectional } Individual

Ecological → Populatⁿ → Ecological fallacy

UNIT OF STUDY		
cohort	→	Individual
CC	→	Individual
CS	→	Individual
E	→	Population
RCT	→	patient/case
Descriptive	→	Populatⁿ

→ All analytical studies are individual except Ecological

CONFOUNDING & BIAS

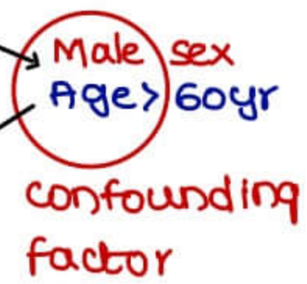
CONFOUNDING = Error

→ Any factor associated both t exposure & outcome

↓ leads to

Mistaken estimate of outcome

→ Smoking [Exposure] → Lung CA [outcome]



2020 100 smokers: >60y Male, >60y Males
100 Non smokers: <20y female, >60y Males

2035 Lung CA: ~~80~~, ~~90~~, ~~86~~
10 Lung CA: 80, 80, 80

→ confounding can be removed by MATCHING
- Equal distributⁿ of confounding factors in both the groups

→ confounding can be removed by
1. Matching → MC used / Simplest
2. Randomisatⁿ → 2nd Best Method
3. Restrictⁿ
4. Stratificatⁿ
5. Statistical Modelling / Multivariate analysis
6. stratified Randomisatⁿ → Best method

BIAS

→ Type of Systematic error

→ 3 Groups

Subject Bias	• Recall Bias (case control study) • Hawthorn Bias [cohort study]
Investigatory	• Interveiwer Bias → eliminated by devoting equal time • Selectⁿ Bias • misclassificatⁿ Bias
Analyser	• calculatⁿ Error → Not seen now a days

BERKESONIAN BIAS → dlt different hospital admission rates

→ Eg

Medical college 2020	Medical college 2021
No oncology Department	Oncology Department +nt
↓	↓
1 / 100 OPD	10 / 100 OPD

→ Based on location & reputat^{n} of an institute

→ Type of Investigator Bias

PYGMALION BIAS → ↑ed motivat^{n} by Teachers , ↑ the marks of Students

→ Type of Investigator [3rd person] Bias → select^{n} Bias

GOLEM BIAS → Demotivat^{n} by Teachers can decrease marks of Students

BLINDING

Types

Single Binding → Subjects are not aware OF Rx
Used to remove Subject Bias

Double Blinding → subject & investigator not aware
removes Subject & investigator Bias
mc seen Blinding

Triple Blinding → Subject, Investigator & Analyser not aware
Removes Subject, Investigator & Analyser Bias
Best Blinding

Open study → complete absence of Blinding

RCT , TRIALS

RANDOMISED CONTROL TRIAL [RCT]

Equal & Known Chance — Comparis^{n} Group — New Drug

→ A New Anthpyretic Drug → M

→ Unit of study → Patient / cases

RCT — 200 fever patients

100 pt → Experimental Group
Interventn Given
↓
(I) M Drug given
↓
70% Reductn of fever

100 pt → Reference group
No Interventn
↓
(I) NO Drug given
↓
10% Reduction of fever

25% people may take PCM → subject Bias
↓
Hawthorne Bias

(II) M Drug given
↓
70% Reductn of fever

(II) Placebo given
↓ single Blinding
10% Reductn of fever

(III) M Drug given
↓
1 Death occurs
→ Cross over
→ Drop out

(III) old Drug [PCM]

→ ITT [Intentn to Treat Trial] → Results of RCT are not affected by deaths, Dropouts or cross overs

→ In Preclinical Trials → came to know that (M) works only if fever >103°F
→ Company Hides it &

High grade fever — 100 pt → EG (M)
RCT
Low grade fever — 100 pt → RG [PCM]

- Selectn Bias
- Selectn Bias in RCT removed by Ranclomizatn
  Randamisation applied
  1. At Selectn of 200 pts
  2. At distributn into EG & RG ← Best time for Randomizatn
  3. At Medicatn
  4. At comparision of Results

→ Randomisatn Remove → selectn Bias
Remove → Confounding

Matching removes → Confounding

Blinding removes → Bias

→ RCT > RCS > PC > CC > CS > E

Types of Randomised Trials

1 clinical Trials
2 Preventive Trials
3 Risk factor Trials
4 Cessatn Experiment
5 Trial of etiological Agents
6 Evoluatn of Health services

Types of Non Randomised Trials

1 uncontrolled Trials
2 Natural Experiment
3 Before & After comparision Studies

CLINICAL TRIALS

Phase I → Healthy Human Volunteers
Done for safety & non - toxicity
max. tolerated dose tested

Phase II → Patients
Done for Efficacy
max. drug failure is seen

Phase III → Patients
Comparision i existing drug
New Drug launched in market
RCT done
most important phase

Phase IV → Patients
Done for long term side effects
Post Marketing surveillance
Longest - Time period → life long [ideal] or 10-25yrs

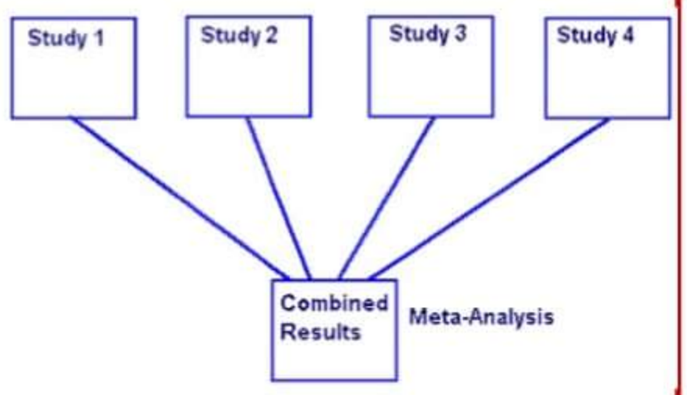
Phase 0 → Healthy human volunteers
For microdosing [eg. 1/10th dose]

➡ Pre clinical Trials done in Animals

EBM, META ANALYSIS, other studies

META ANALYSIS

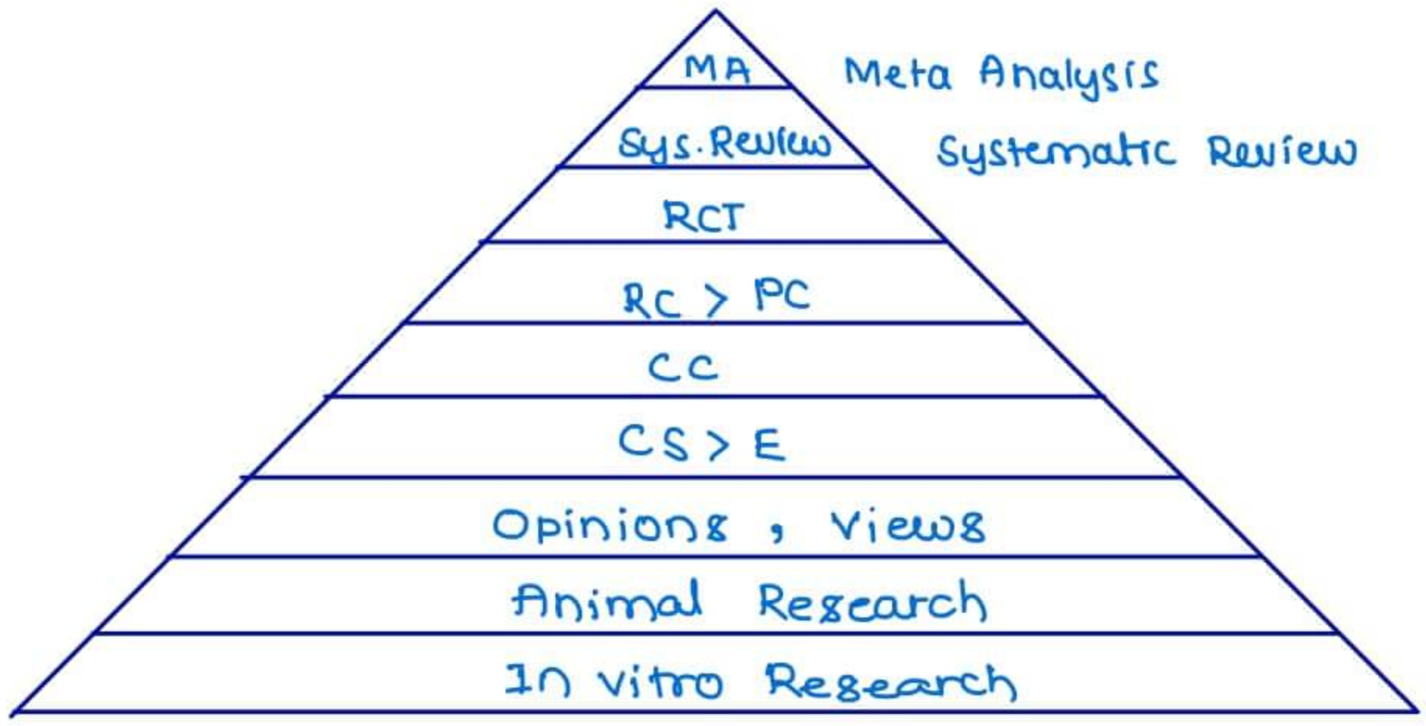
→ Analysis of AnalysES
Analysis of Multiple studies together



→ Eg. 96 Studies ⟶ Single Result

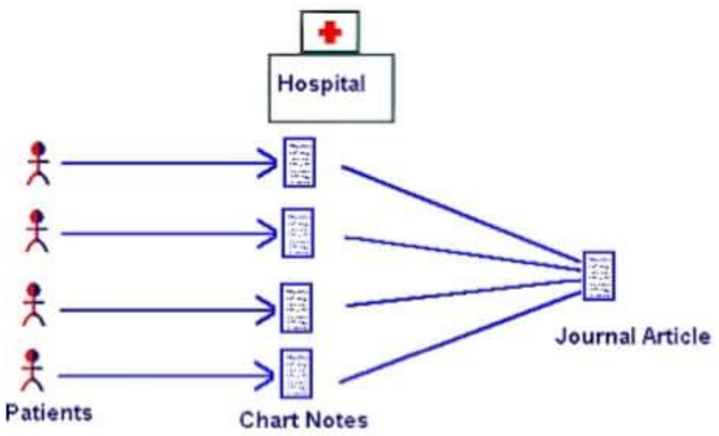
→ Meta Analysis > RCT > RCS > PC > CC > CS > E

Evidence Based Medicine [EBM]

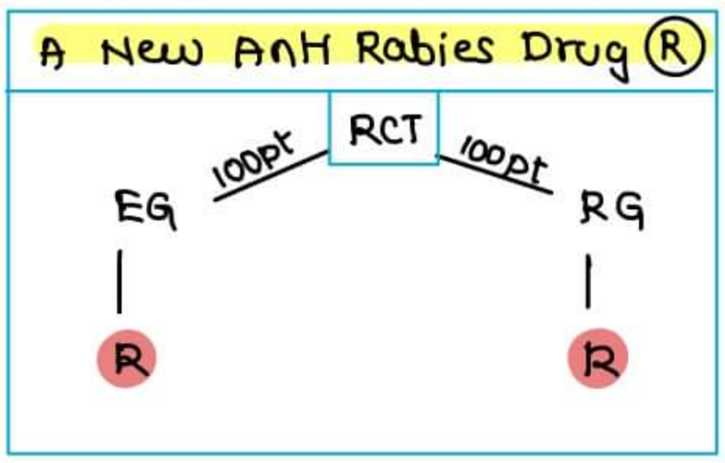


→ Top of EBM → Meta Analysis
→ Gold std for EBM → Meta Analysis
→ Father of EBM → DL SACKETT

Case Report Study → Report of a single case of a disease
Case Series Study → Report of a multiple cases of a disease
Pre post Clinical Trial → Rabies ~ 100% fatal



Case series Study



→ If the new drug R is beneficial, then all patients are benefited.

→ If it is not beneficial, no change in the out come, as rabies is ~ 100% fatal

- EG Will act as their own RG
  - EG - Experimental group
  - RG - Reference group

KAP studies → Used in family Planning study

Knowledge

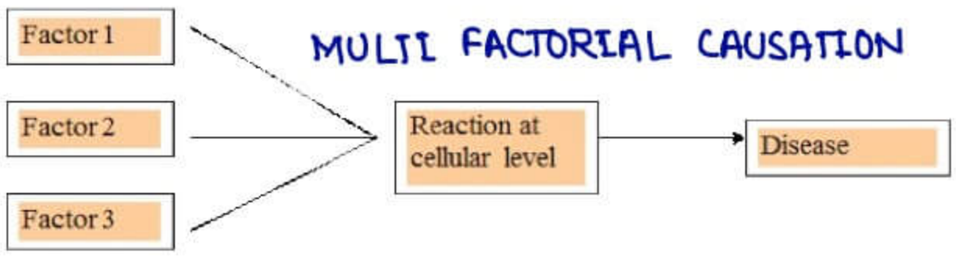
Attitude

Practices

DISEASE CAUSATION, MEASUREMENTS, MILE STONES

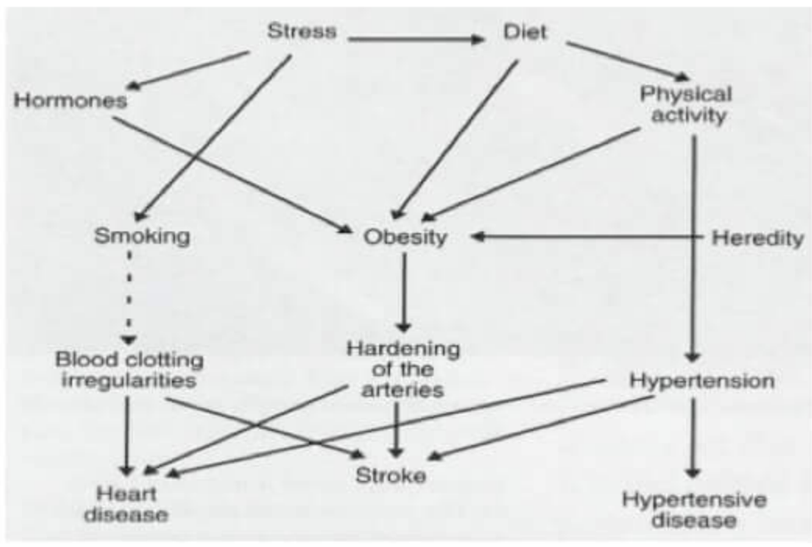
THEORIES OF DISEASE CAUSATION

1. Theory of spontaneous Generat^{n} → Given by Aristotle
2. Germ Theory of Disease → by L. Pasteur
3. Multifactorial causat^{n} of Disease → by Pattenkoffer
4. Web of causat^{n} → by Mc Mohan & Pugh
5. Epidemiological Triad → Agent, Host, Environment
   Closed → interaction b/w them
6. Epidemiological Triangle → Agent, Host, Environment
   Time at centre
7. Advanced model of Epidemiological Δle → Agent is replaced by causative factors
   Not only Environmental factors, but also Nutritional, Genetic, psychological factors required



8 BEINGS MODEL

- B Biological & Behavioral factors
- E Environmental factors
- I Immunological factors
- N Nutritional factors
- G Genetic factors
- S Social, Services & Spiritual factors



Web of causat^{n}

9. HILL'S Criteria of Causal Association / Surgeon General's Criteria

1. Temporality → Cause preceeds effect
   → Best established by cohort study
   → most important criterion

2. Specificity → Diseased caused only by a particular risk factor
   → most difficult criterion to establish

3. consistency → Results must be replicable in different settings

4. Strength → RR or Odd's Ratio

5. Biological plausability → Results are scientifically rational [explainable]

6. coherence → studies must support each other's result
   S_1 → smoking ↑ed in females
   S_2 → smoking is a RF of Lung CA
   S_3 → Lung CA ↑ed in females

7 Dose Response Relationship → ↑ in dose should ↑ Response

8. cessat^{n} of Exposure → Stoping the exposure ↓ Disease incidence

TOOLS OF MEASUREMENT IN EPIDEMICS

RATE → $\frac{a}{b} \times \begin{matrix}1000\\10000\\100000\ldots..\end{matrix}$ a is part of b

RATIO → $\frac{a}{b}$ a is not a part of b

PROPORT^{n} → $\frac{a}{b} \times 100 = \%$ a is part of b

→ Incidence ⟶ $\frac{\text{New cases}}{\text{Total Populat}^{n}\text{ at risk}} \times 1000$ ⟶ Rate

→ Prevalence ⟶ $\frac{\text{New + old cases}}{\text{total populat}^{n}} \times 100$ ⟶ Proportion

→ Sex Ratio → $\frac{\text{Females}}{\text{Males}} \times 1000$ → Ratio

→ 943

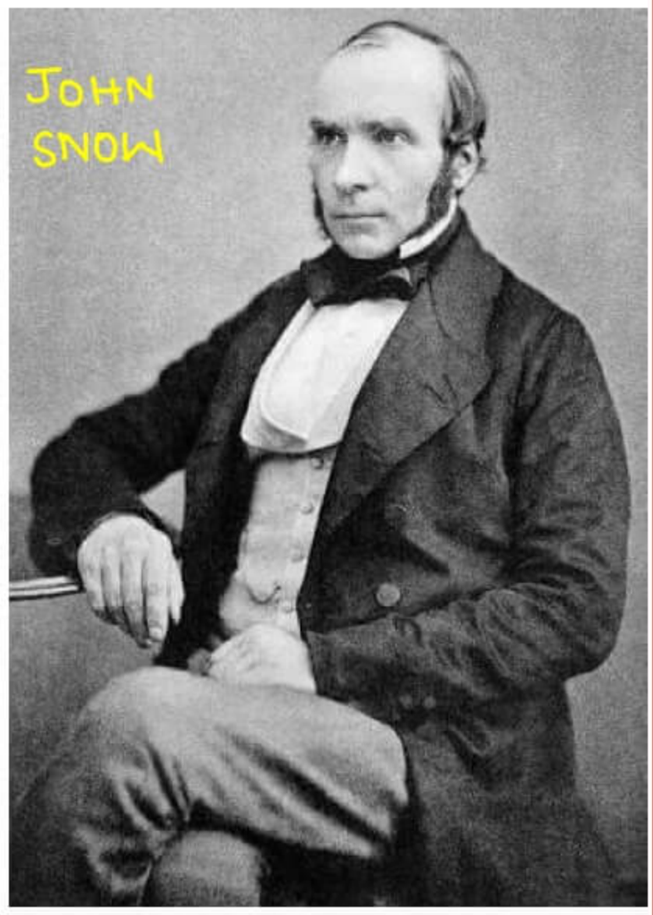
→ Case Fatality Rate → $\frac{\text{NO. OF Deaths}}{\text{NO. OF Cases}} \times 100$ → Proportion

→ CFR of Rabies ~ 100%.

CFR of JE ~ 30 - 35 %.

→ IMR → $\frac{\text{NO. OF Infant Deaths}}{\text{Live Births}} \times 1000$ → Rate

→ MMR → $\frac{\text{NO. OF M. Deaths}}{\text{Live Births}} \times 1,00,000$ → Ratio



→ Father of Epidemiology → JOHN SNOW

father of modern Epidemiology → JOHN SNOW

father of Medicine → Hippocrates

First true Epidemiologist → Hippocrates

first distinguished Epidemiologist → Sydenham

Father of public health → Cholera

National Institute of Epidemiology → Chennai

VACCINS & COLD CHAIN

IMMUNITY

Infections → ACTIVE
vaccines → formed in body

Immunoglobulins → PASSIVE
Vertical Transmisn → formed outside body
[mother → child]

CLASSIFICATION OF VACCINES

LIVE
BCG
OPV
Measles
Mumps
Rubella
Y. fever
varicella
Typhoral
JE live
H_1N_1 live
Rotaviral

Killed
Pertussis
Rabies
IPV
Hep A
Meningococcal
KFD
JE killed
H_1N_1 killed

Toxoids
Diphtheria
Tetanus

combinatn
MMR, MR
DPT
Pentavalent

Proteinaceous
Acellular Pertussis
Anthrax

Polysaccharide
Typhim – Vi
Pneumococcal
Meningococcal
Hib

Glycoconjugate
Pneumococcal
Meningococcal
Hib

Recombinant
Hepatitis B
HPV

NATIONAL IMMUNIZATION SCHEDULE 2017-18

→ component of UIP [universal Immunizatn Programme] 1985 [earlier Name – Extended Programme of Immunizatn [EPI], 1978]

→ UIP is a part of RCH Programme under National Health Mission [NHM]

→ Starts at Birth & Completes at 16yrs of Age for boys [for girls ⊕ TT during pregnancy]

TT in Pregnancy

At Birth	→	BCG, OPV_0, Hep B
6 Weeks	→	DPT_1 OPV_1 $HepB_1$ HiB_1 $Rota_1$ $FIPV_1$ PCV_1
10 weeks	→	DPT_2 OPV_2 $HepB_2$ HiB_2 $Rota_2$
14 weeks	→	DPT_3 OPV_3 $HepB_3$ HiB_3 $Rota_3$ $FIPV_2$ PCV_2
9 Months	→	Measles 1 or MR1, Vit A [1 lakh], JE Live 1, PCV – Booster
Every 6 months	→	Vitamin A [2 Lac IU each] till 5 yrs
16–24 months	→	DPT_B OPV_B, Measles –2 or MR–2, JE Live–2
5 years	→	DPT_B 10 yrs → TT 16years → TT
[PROPOSAL	→	TT at 5 yrs, 10 yrs, pregnancy to be replaced by Td]

Pentavalent vaccine → DPT, Hep B, HiB by im

Total vitamin - A dose in NIS → 17 Lac IU

No. of doses under NIS

OPV	→	5
TT	→	7
BCG	→	1
Diphtheria	→	5
Pertussis	→	5
Hep B	→	3
HiB	→	3
Rota Viral	→	3
JE live	→	2
PCV	→	3
Measles	→	2
MR	→	2
IPV		
fIPV [Id]	→	2
Im	→	1
Vitamin A	→	9

DELAYED IMMUNIZATION [under NIS]

BCG	→	Till 1 year age
OPV	→	Till 5 yrs age
DPT	→	Till 7 yrs age
Hep B	→	Till 1 yr age
HIB	→	Till 6 yrs age
Rota Viral	→	Till 8 months age
Measles	→	Till 5 years age
JE	→	Till 15 years age
Vitamin A	→	Till 5 years age
TT	→	Till No limit

Pentavalent	→	till 1 yr age
fIPV	→	till 1 yr age
PCV	→	till 1 yr age

CONTRAINDICATIONS, AEFIS

Contraindications

1 Pregnancy → All live vaccines c/I Except YF vaccine
- Attenuation → Reduct^{n} of VIRULENCE & Maintainance of ANTIGENICITY
- Pregnancy is a immunocomprimised state

2 HIV Positive → All live vaccines c/I
- Asymp. Adult → No vaccine c/I
- Symp. Adult → All live vaccines c/I except MMR, Varicella, Zoster
- Newborn → All live vaccines c/I except OPV, Measles

3 Immunosuppression → All live vaccines C/I
Corticosteroids

4. Lactath → Y. fever vaccine C/I

5 Fever → Typhoid vaccine C/I
Diarrhea → No C/I
PEm → NO C/I
Epilepsy → D P T vaccine C/I Pertussis → Active progressive Disorder → C/I
Cerebralpalsy → No C/I

6 During Epidemic → All vaccines C/I except Measles

Mumps
Rubella
Diphtheria → 2-6 Days
M. meningitis
Influenza
Food Poisoning
Typhoid → 10-14 Days
Cholera

- Vaccines require 6-8 WKS to form immunity
- max. IP of common epidemics is <21 Days
- C/I in intra epidemic
- Indicated in Inter Epidemically
- Measles
  - IP – 10-14 Days
    10 th Day fever starts
    14 th Day rashes starts
  - IP of vaccine induced measles → 7 days
  - Postexposure vaccine must be used within 3 days of exposure

Measles IP Period
1. 10 Days
2. 12 Days
3. 14 Days
4. 16 Days

7. Post Disaster → All vaccines C/I
8. C/I together → Yellow fever & Cholera
   Maintain a gap of 3 wks

AEFI [Adverse Event following Immunizatn]

→ Observatn period after administratn of vaccine → 30 minutes
→ MC Vaccine Associated with
1. Paralysis → OPV
2. Hypersensitivity → Hep B > DPT
3 Shock → Hep B > DPT
4. TSS → Measles

→ MC Vaccine Associated ī

5	GBS	→	Killed Influnza vaccine
6	Intessuscept^{n}	→	Rota viral
7	Fever	→	Pertussis [DPT]
8.	Febrile seizures	→	Measles
9	HHE [Hypotensive Hyporesporsive Episode]	→	Pertussis
10	Persistent Inconsolable crying	→	Pertussis
11	Osteomyelitis	→	BCG
12	LAP [Lymphadunopathy]	→	BCG
13	Brachial neuritis	→	TT
14.	Thrombocytopenia	→	MMR

WALK IN COLD ROOM

WALK IN FREEZER

COLD CHAIN IN INDIA

COLD CHAIN

→ maintainance of temperature of all vaccines from point of Manufacture to Point of Administration

→ Temp. of cold chain → +2°C to +8°C

Except OPV [long term storage] → −15°C to −25°C

Yellow fever vaccine → −30°C to +5°C

					Durat^{n} of storage
→ State / Regional	→	Walk in Cold Rooms	→	+2°C to +8°C	3 months
		Walk in freezer	→	−15°C to −25°C	
CHC / District	→	Large ILR	→	+2°C to +8°C	1 months
		Large Deep freezer	→	−15°C to −25°C	
PHC	→	Small ILR	→	+2°C to +8°C	1 months
		Small Deep freezer	→	−15°C to −25°C	
Sub centre	→	Vaccine carrier	→	+2°C to +8°C	24-48 hrs
Village	→	Ice pack	→	+2°C to +8°C	02-04 hrs

→ Lowest level of vaccine storage in India → PHC

→ max. cold chain failure occurs at → Sub centre & below

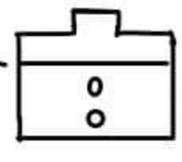
ILR [Ice lined Refrigirator] → 

→ >8hrs of electricity / Day required

→ Lout electricity – can maintain <5 Days

Vaccine carrier  

→ 4 ice packs ; 16-20 vials, upto 24-48 hrs

ICE PACK water level 

→ upto 2-4 hrs, plain tap water

ICE Pack

REVERSE COLD CHAIN

→ part of National Polio Eliminatⁿ Programme

→ Transportatⁿ of Polio stool samples at +2°C to +8°C

WARM CHAIN / KANGAROO MOTHER CARE

→ Used for Neonatal hypothermia in Low BW, pre mature New Borns

LYOPHILISED VACCINE [freeze dried vaccine]

→ available in Powder form

→ Reconstitutⁿ by DILUENT

BCG	→	Normal Saline
YF	→	Cold saline
MMR	→	Distilled water / Sterile water
Measles	→	Sterile water
JE	→	Phosphate Buffer saline
HiB	→	DPT / Saline

Used ē in 4hrs except YF vaccine → < ½ hr

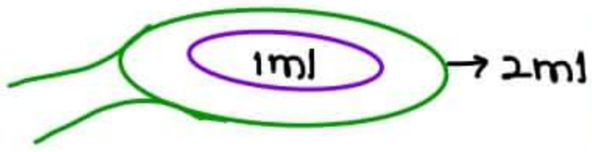
↓

Otherwise Toxic shock syndrome can occur

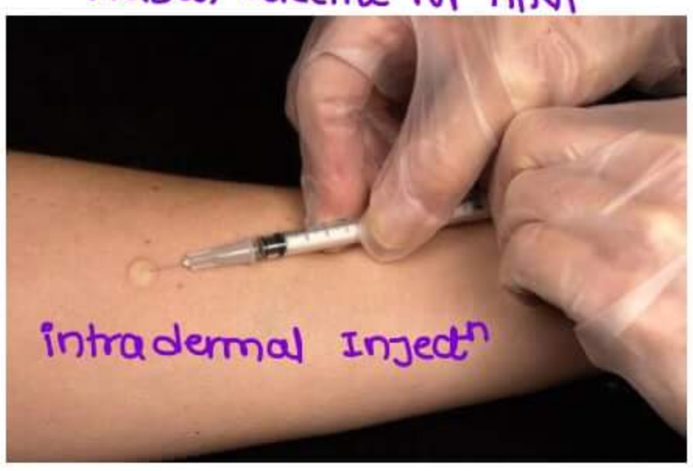
VACCINES	STRAINS
BCG →	Danish 1331
	Derived from M. bovis
	Time required is 13 yrs [239 Serial subcultures] for single dose
OPV →	P1, P2, P3 [Bivalent P_1, P_3]
Measles →	Edmonston Zagreb
	Schwarez
	Moraten
Mumps →	Jeryll Lynn
Rubella →	RA 27/3
Yellow fever →	17 D
Varicella →	OKA strain
JE killed →	Nakayama, Beijing P3
JE live →	SA - 14 - 14 - 2
H_1N_1 →	A7/California/2009
Rabies →	fixed viral strain
Anthrax →	Sterne strain
Typhoral →	Ty 21a
Anti malaria →	Lific cocktail [Spf66]
Mosquirix →	RTS, S
Anti HIV →	MVA [modified vaccinia ANKARA]

	BCG	OPV	DPT	Hep B	Measles	Vit A	Rabies	
DOSE	0.05 ml	2 Drops / 1 ml	0.5ml	0.5ml	0.5ml	1ml/2ml	1ml	0.2ml
ROUTE	ID	Oral	Im	Im	SC	Oral	Im	ID
SITE	(Lt) Deltoid		AL thigh	ALTHIGH	Rt Arm		Deltoid	multi sites

→ Strength of vit A 100,000 IU/ml



Nasal vaccine for H_1N_1



Rabies Vaccine Schedules

1 Post Exposure

		Day 0 3 7 14 28
Im	ESSEN REGIMEN →	1 - 1 - 1 - 1 - 1
ID	THAI UPDATED RED CROSS REG. →	2 - 2 - 2 - 0 - 2

2 Pre Exposure

Im Day 0 7 21/28

Anti Cervical Cancer vaccines

1 Cervarix Bivalent → HPV 16,18

2. Gardasil Quadrivalent → HPV 16,18,6,11

→ Age group → 9 - 25 yrs

Ideal → at onset of Puberty

→ For Both Boys & Girls

3. GARDASIL 9 Nonivalent → HPV 16, 18, 6, 11, 31, 33, 45, 52, 58

ROLL OF

$Al(OH)_3$ in DPT → Adjuvant [↑ antigenicity]

Thiomersal in DPT → Preservative

$MgCl_2$ in OPV → Thermostabilizing agent

EFFICACY of Single dose

BCG → 0 - 80%. [~50%]

Measles → > 90%

Rubella → > 95% [highest]

→ First vaccine → Edward Jenner [small pox vaccine]

Term 'vaccine' → Louis Pasteur

Term 'vaccinatn' → Edward Jenner

Edward Jenner

1. MALARIA VACCINE MOSQUIRIX [RTS, S]

→ A recombinant protein based malaria vaccine
→ World's first Licenced malaria vaccine
→ Efficacy → 26 - 50% in infants & young children
→ Preparation → Pre Erythrocytic circumsporozoite protein [CSP] of the Plasmodium falciparum malaria parasite + Envelop protein of the Hepatitis B virus [HBSAg] + Adjuvant [AS 01]

2. DENGUE VACCINE - DENGVAXIA [CYD - TDV]

→ WHO endorsed world's 1st ever vaccine for Dengue fever
→ Live recombinant tetravalent vaccine ī dilute saline, no adjuvants, no preservatives
→ STRAIN → CYD - TDV
→ Age group → 9 - 45 yrs age living in endemic areas
→ SCHEDULE → 3 injections at 0, 6 & 12 months
→ PRODUCTION OF VACCINE
  → Replacement of PrM [Pre - membrane] & E [envelop] structural genes of the yellow fever attenuated '17 D strain vaccine' ī those from 4 Dengue serotypes [D_1, D_2, D_3, D_4]

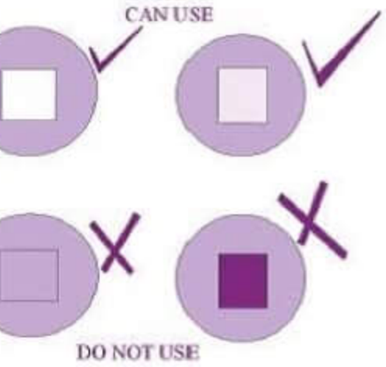
3. MYOBACTERIUM INDICUS PRANII [MIP] VACCINE

→ made in India Leprosy vaccine to be launched
→ to be given along ī a dose of Rifampicin
→ Developed by GP Talwar [founder Director, National Institute of Immunology, Delhi]

SWITCH

t_{OPV} ⟶ b_{OPV}
P_1 P_2 P_3 ⟶ P_1 P_3

India → 25th April '2016
Pakistan, Afganisthan, Nigeria → Polio ⊕nt



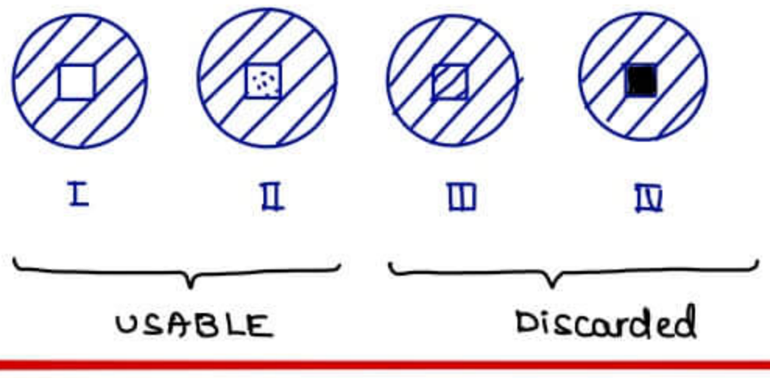
MISSION INDRADHANUSH

→ 7 Vaccine Preventable diseases

1. TB
2. Polio — Rota Virus
3. Diphtheria + MR
4. Pertussis — IPV
5. Tetanus — JE
6. Hepatitis B
7. Measles

→ 100% coverage by 'catchup campaigns' irrespective of previous immunizat^n status by 2020

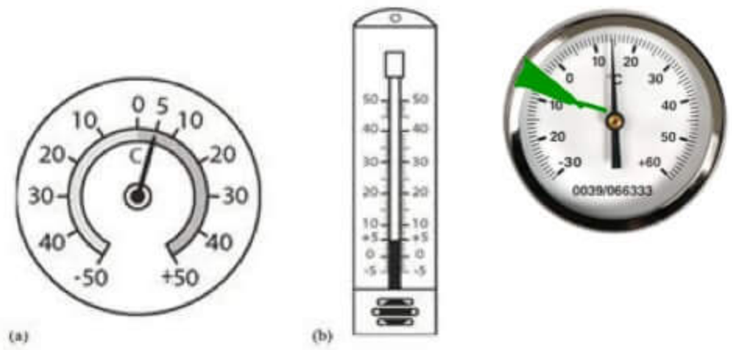
VACCINE VIAL MONITOR



→ Marker of Cold Chain maintainance of vaccine
~ Potency of the vaccine

DIAL THERMOMETER

→ used for cold chain temperature monitoring
→ done twice / day
→ even a health worker can do monitoring ī this
→ Based on Thermo couple



HEALTH & DISEASE

PQLI, HDI, MDPI

PHYSICAL QUALITY OF LIFE INDEX

→ Index - combination of Indices

→ INDICES

① Literacy Rate

② Infant Mortality Rate

③ Life Expectancy 1 year

→ Range → $0 < PQLI < 100$

→ value for India → 65

HUMAN DEVELOPMENT INDEX

→ INDICES

① Literacy Rate / Knowledge / mean years of Schooling / Educatⁿ index / Enrolment Ratio
- Mean years of Schooling [Preferred]

② Income / Income per capita / US $ PPP
- PPP → Purchasing Power Parity

③ Life Expectancy$_{Birth}$ / LE_0 / Longevity at Birth

→ Range → $0 < HDI < +1$

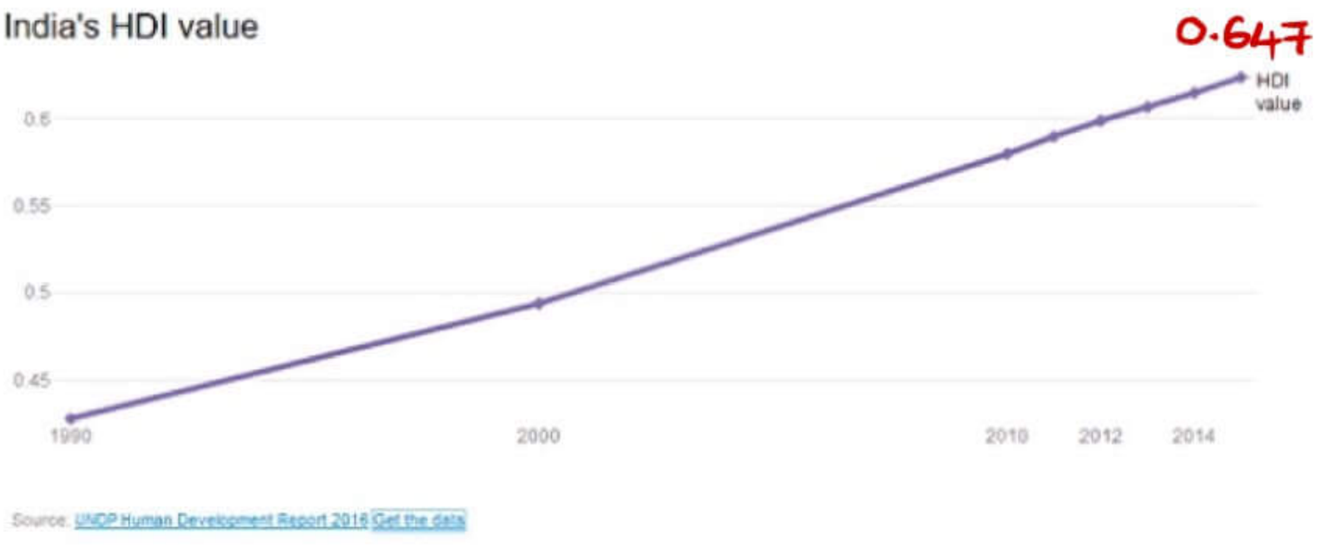
→ value for India → 0.647 [Rank-129]
- medium development

value for Norway → 0.9 [Rank 1]
- most developed country

HDI CALCULATION

	MINIMUM	MAXIMUM
MYS [Mean Years of Schooling].	0	13.1
EYS [Expected Yrs of Schooling]	0	18
EDUCATION INDEX	0	0.978
INCOME [PPP]	100 $	107,721 $
LE_{Birth}	20yrs	83.4yrs

→ HDI is complimentary to HPI Human poverty Index



HUMAN POVERTY INDEX

→ Earlier categories HPI 1 [for Developing countries] ; HPI 2 [for developed countries]

→ NOW → MDPI [Multi Dimensional Poverty Index]

MDPI

components

INDICATORS	SUB INDICATORS
a. Health	Child mortality
	Nutrition
b. Educat^{n}	Years of schooling
	School attendance
c. Living Standards	Fuel
	Water
	Electricity
	Toilet
	Floor
	Assets

Range → $0 < MDPI < +1$

INDIA → 0.121 [29.5% poor]

INTERPRETAT^{n}

- 20 – 33.33% → Vulnerable to poverty
- > 33.33% → Poverty
- > 50% → Severe Poverty

Overall → Deprivat^{n} in > 1/3 is POVERTY

BPI [Below Poverty Line]

1. Caloric Intake
   - Rural → < 2400 K.cal / Day *
   - Urban → < 2100 K.cal / Day *

2. Income Per Capita

	Tendulkar committee 2011-12	Rangarajan committe 2013-14
– Rural	< 27/- per day	< 32/- per day
– Urban	< 33/- per day	< 47/- per day
	– 22% BPL	– 29.5% BPL

3. Income Per capita [World Bank]

→ Extreme Poverty < US $ 1.90 per Day
Moderate Poverty < US $ 3.10 per Day

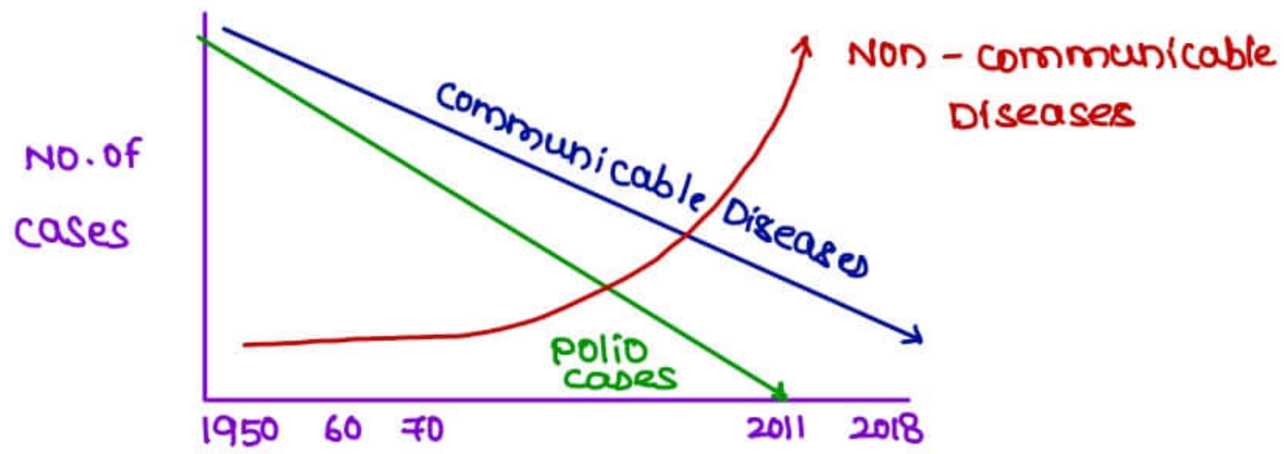
TIME DISTRIBUTION, EPIDEMICS

TIME DISTRIBUTION OF DISEASE

I. Short term fluctuations [Days - weeks - months] → EPIDEMIC
II Long term fluctuations [Decades] → SECULAR TREND [slow rise or slow fall]
III Periodic fluctuations [Repeatedly]
→ Seasonal Trend → ↑ or ↓ in a particular season
→ Cyclical Trend → ↑ or ↓ in a populatⁿ after a gap of every few years.

→ Food poisoning → Epidemic
Bhopal Gas Tragedy → Epidemic ; Methy Iso Cyanide exposure on 3-12-1984
Chernobyl Tragedy → Epidemic ; Cesium [Cs], Iodine [I_2] & Strontium [Sr] exposure on 26-04-1986

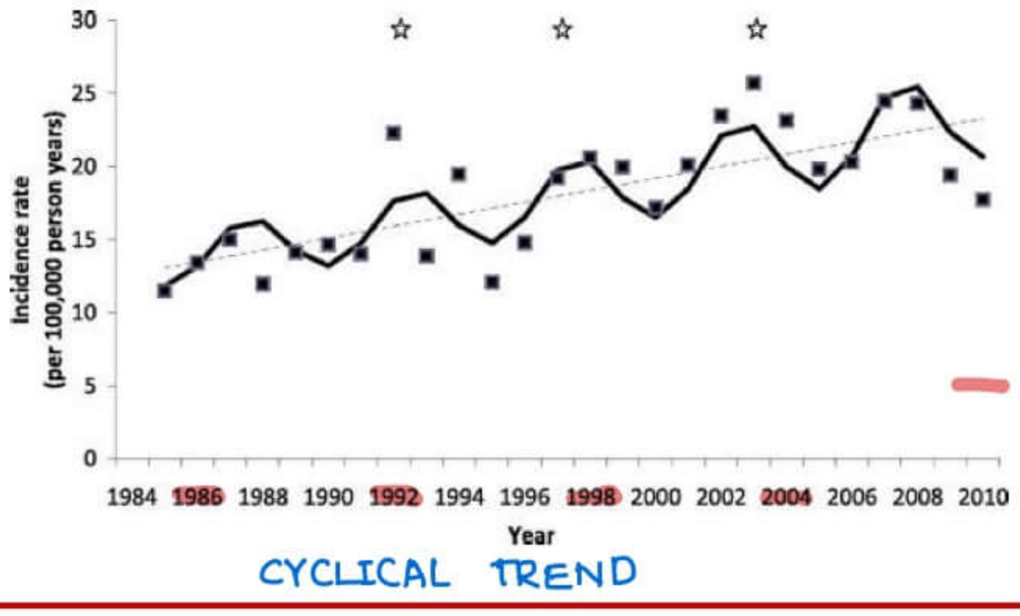
→



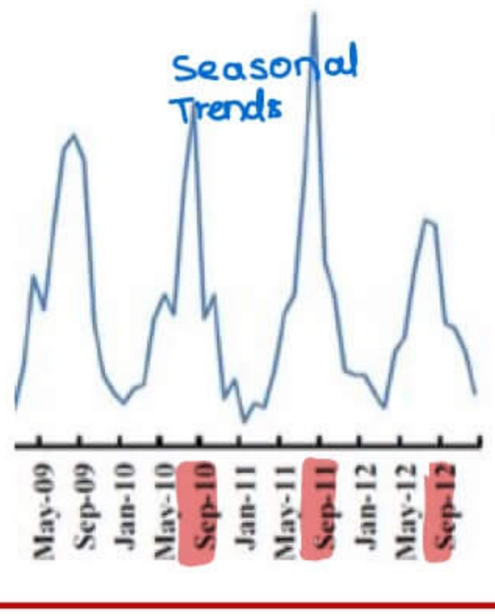
⟹ SECULAR TREND

→ SEASONAL TREND → Malaria, Dengue in Rainy Seasons
→ Respiratory infectⁿ in Winter Seasons
→ Heat stroke in Summer

→ CYCLICAL TREND → Measles → once / 2-3yrs
Rubella → once / 6-8 yrs
Influenza show max. cyclical trend b/c of
Max. Antigenic variatⁿ → Drift [d/t point mutations]
→ Shift [d/t genetic ReAssortments]

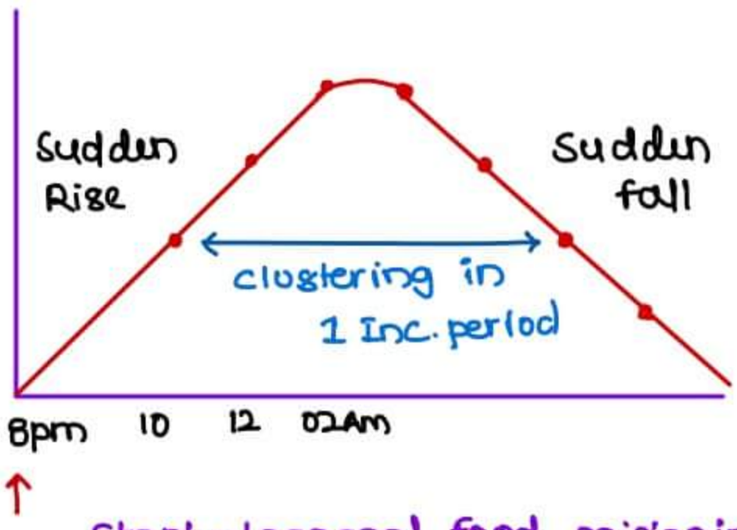


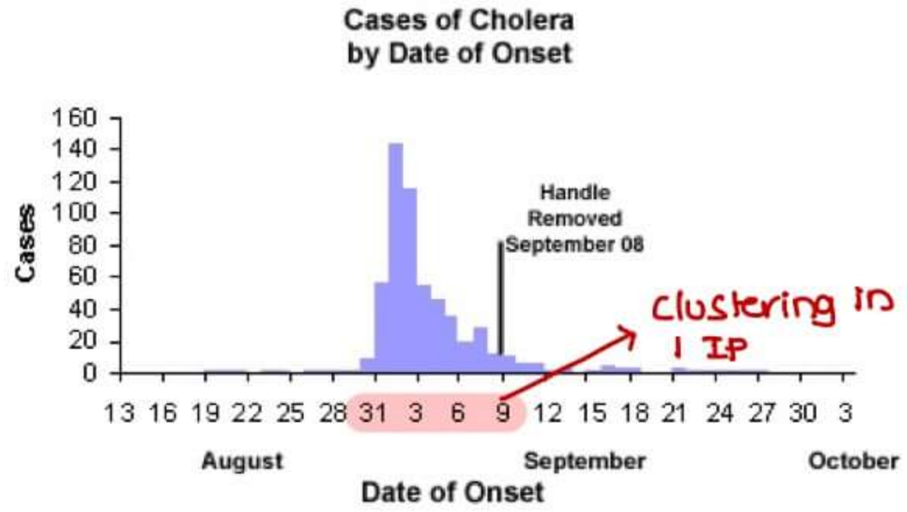
CYCLICAL TREND



TYPES OF EPIDEMICS

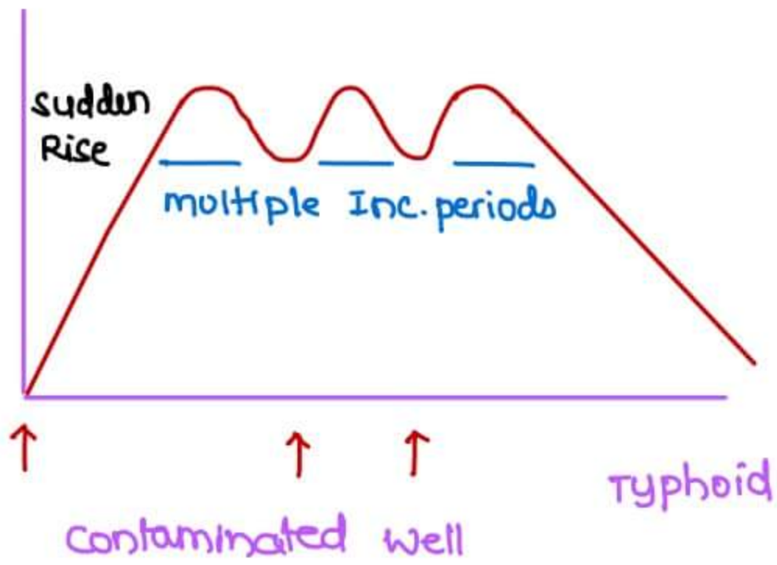
I Single Exposure, Point Source Epidemics





↑ Staphylococcal food poisioning [IP → 1-6 hrs]

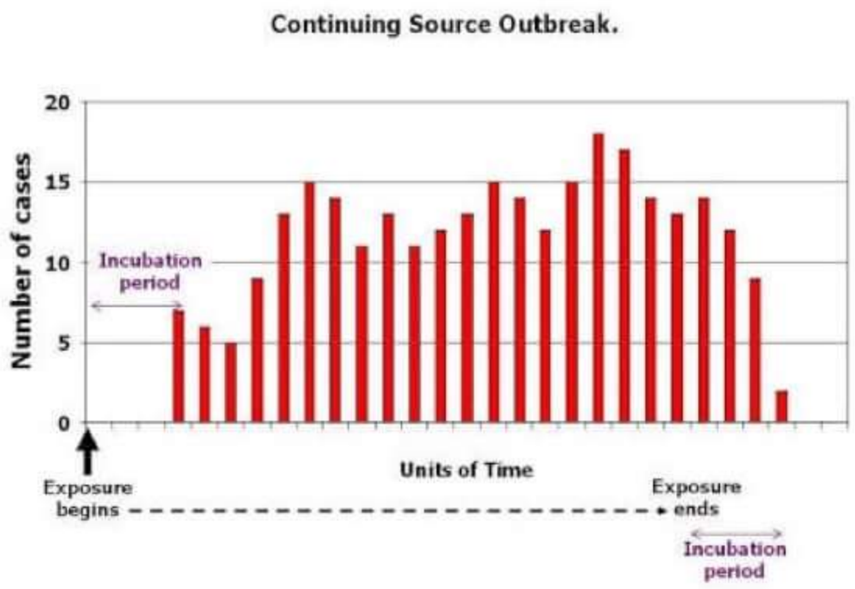
II Multiple Exposure, Point source Epidemics



↑ ↑ ↑

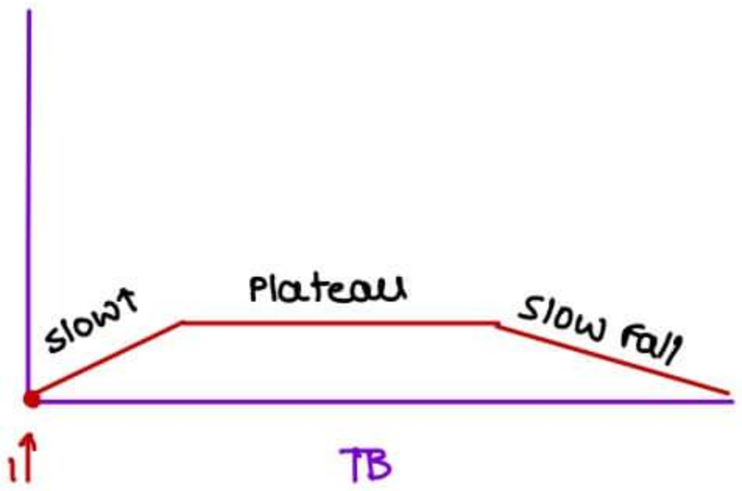
Contaminated well

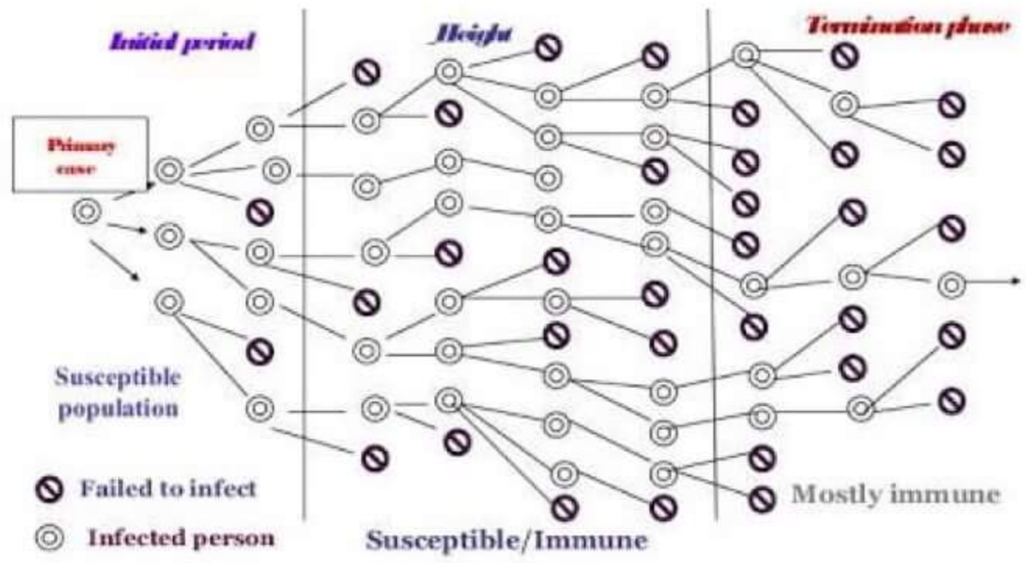
Typhoid ⟶ IP → 10 - 14 Days



- multiple peaks are known as SECONDARY WAVES

III Propagated Epidemics





→ 1case of TB not on Rx can give rise to 10-15 cases/years [not more cases d/t Sub clinical immunity]

→ only shown by diseases which have PERSON - PERSON TRANSMISSION

→ may show SECONDARY WAVES some times.

→ BGT [Bhopal Gas Tragedy] → Single Exposure Point source Epidemic
CT [Chernobyl Tragedy] → Single Exposure point source Epidemic
HIV / STD → Propagated Epidemic [Person - Person Transmis^n]
HIV/STD [commercial Sex workers] → Multiple Exposure Point Source Epidemic
Polio [if in India Now] → Propagated Epidemic

EPIDEMIC

→ No. of cases of a disease clearly in excess of normal expectancy

- 2017 → 4900 cases
  2019 → 5600 cases
  2020 → 4900 cases
  → 2018 → 15000 cases → EPIDEMIC

Normal Expectancy of Polio in India → 0
if 1 case reported → Epidemic

→ No. of cases of Disease > Mean + 2 SD → Epidemic

- Mean → 5000 cases / yr
  SD → 800 cases / yr
  Epidemic → 5000 + (2)(800) → > 6600 cases / year

→ New Disease occurence is EPIDEMIC

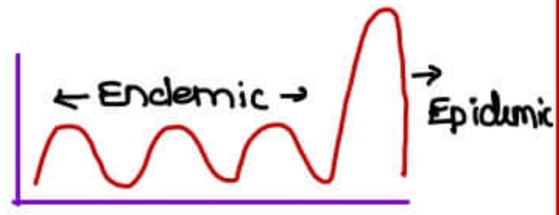
→ Reoccurence of Disease is EPIDEMIC

ENDEMIC

→ "Constant or continuous presence" of a disease in a populatn
→ Endemic Diseases in India

- Measles, Mumps, Rubella, Chicken Pox, Pertussis
  TB, HIV, Cancers, Diabetes, HTN, CHD

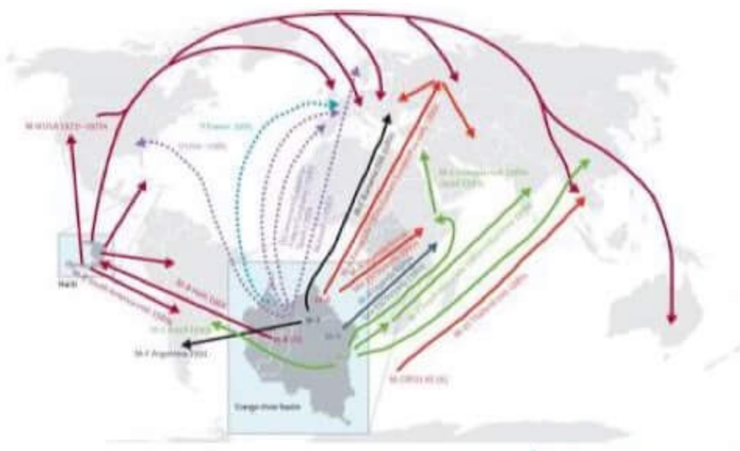
→ Epidemics can arise from Endemics also



PANDEMIC

→ country - to - country Spread
→ Eg.

- H_1N_1 [Swine flu]
  H_5N_1 [Bird flu]
  HIV [largest pandemic]
  Ebola
  Zika
  H_7N_9 [Next possible Pandemic]



PANDEMIC

SPORADIC

→ Scattering of Cases in Time, person
→ Eg

- Arsenic poisoning
- Snake Bite

Disease showing Epidemic, Endemic, Pandemic & Sporadic → INFLUENZA [H_1N_1, H_5N_1]

ELIMINATION, ERADICATION, SURVEILLANCE

CONTROL

→ Reduct^{n} of transmission to such a low level that it stops to be public health problem

→ ↓ Incidence , ↓ Durat^{n}, ↓ Financial Burdn , ↓ Complications

ELIMINATION

→ complete interrupt^{n} of transmission but Organism still present

→ Regional [country] term

→ In INDIA

1. Gunie Worm [Dracanculiasis] → Feb 2000
2. Leprosy → Dec 2005
3. Maternal Tetanus , Neonatal Tetanus → July 2016
4. Yaws → July 2016

Gunie worm

→ Eliminat^{n} level for leprosy → <1case/10,000 popwlat^{n}

Eliminat^{n} level for NNT → < 0.1 case | 1000 Live Births

ERADICATION

→ Complete exterminat^{n} of Organism

→ Global term

→ All or None phenomenon +nt

→ Eradicated Diseases globally

1. SMALL POX [8th May 1980] - only disease eradicated until now
   - last case reported in 1977 in Somalia
2. POLIO virus Type 2 on 20th September 2015
3. Rinderpest [Cattle Disease]

DISEASE FREE STATUS

→ Polio → 27 - 03 - 2014

→ Trachoma → 08 - 12 - 2017

Candidate / Potential / Target Disease

Eliminat^{n} [India] → POLIO

Eradicat^{n} [World] → POLIO

MONITORING → Analysis of performance of routine measurement

SURVEILLANCE → Ongoing systematic process of [all factors affecting a disease] data collect^{n}, compilat^{n}, analysis & interpretation and its applicat^{n}

MONITORING	SURVEILLANCE
→ continuous overlooking progress of Health activity	→ continuous scrutiny of all factors affecting a disease ī attension, authority & suspicion.
→ No inbult actⁿ component	→ Inbuilt actⁿ component is present
→ NO feedback	→ feedback is inbuilt
→ one time linear process	→ cyclical continuous process
→ smaller concept	→ Broader concept

TYPES OF SURVEILLANCE

1. Passive → Patient reports to Health system on his own [90%]
2. Active → Health System goes to community in search of cases [8-10%]
   → seen in 4 NHPs of malaria by MPW [M] once/fortnight
   Polio by SMO [surveillance MO] as part of AFP Surveillance
   TB by ASHA | TB supervisor
   Kala Azar by House to House visit
3. Sentinel → Used to identify missed / Hidden cases
   seen in NHPs of HIV [in blood back, Anti Natal clinic, STD clinic]

LEVELS OF PREVENTION OF DISEASE

		MODES
PRIMORDIAL	→ before the emergency of Risk factors	→ Health Educatⁿ
PRIMARY	→ Risk factor present But no disease yet	→ Health promotⁿ Specific protectⁿ
SECONDARY	→ Disease possibly started in the body	→ Early diagnosis & Treatment
TERTIARY	→ Disease in progression / over	→ Diability limitatⁿ Rehabilitatⁿ

→ Primary can prevent the Disease/outcome
Secondary can not prevent the Disease | outcome

EXAMPLES

→ Measles vaccines administered at 9 months of age
- at 9 months maternal antibodies are absent → Risk factor for measles
- vaccinatⁿ → specific protectⁿ
- Primary level of preventⁿ

→ Tetanous Toxoid
- Injury [Risk factor] present
- specific protectⁿ for Tetanus

} Primary

→ Hepatitis B vaccine for medical professionals
- Risk is present
- Specific protectn

} Primary

→ Rabies [post exposure] vaccine
- Risk factor present
- Specific protectn

} Primary

Rabies [Pre exposure] vaccine
- Risk factor is present
- Specific protectn

} Primary

→ All vaccines including BCG vaccinatn by default comes under PRIMARY Preventn
Except,
When BCG is used for Rx of Bladder Cancer → SECONDARY Preventn

→ condoms [HIV] → PRIMARY
- Risk factor [HIV/STD]
- Specific protectn

condomes [pregnancy (outcome)] → PRIMARY

→ combined OCPs
IUDS → PRIMARY
Sterilizatn

→ Majority of Contraceptive methods by default comes under PRIMARY PREVENTn
Except in situations like
- Combined ocps in PCOD → SECONDARY [Rx]

→ Sputum smear Examinatn for AFB → SECONDARY [Diagnostic]
→ CXR for Pneumonia → SECONDARY [Diagnostic]
→ Peripheral blood smear Ex. for malaria → SECONDARY [Diagnostic]
→ Blood culture in Typhoid → SECONDARY [Diagnostic]
→ Pap smear [Screening Test] → SECONDARY [Early detectn → Dx]

→ All screenings/All Diagnostic tests by default are SECONDARY Level Preventn

→ DOTS for TB → SECONDARY [Rx]
→ MDT for leprosy → SECONDARY [Rx]
→ ACT for malaria → SECONDARY [Rx]

→ DOC for malaria chemo Prophylaxis → Doxy or mefloquine → PRIMARY [specific protectn]

→ crutches in Polio → TERTIARY [Locomotory Rehabilitat^{n}]
Physiotherapy in Polio → TERTIARY [Disability Limitat^{n} & Rehabilitat^{n}]
→ Spectacles → TERTIARY [Disability Limitat^{n} & Rehabilitat^{n}]

→ IOC for cataract → SECONDARY [R$_{y}$]
LASIK → SECONDARY [R$_{y}$]

→ Mosquito nets → PRIMARY [specific protect^{n}]
Mosquito repellents → PRIMARY [specific protect^{n}]
DDT → PRIMARY [specific protect^{n}]
Gambusia → PRIMARY [specific protect^{n}]

→ Source reduct^{n} for mosquitoes → PRIMORDIAL

→ father asked his son,
- not to adopt bad habits → PRIMORDIAL
- leave his bad habits → PRIMARY [Health promot^{n}]
- son leaves bad habits on advice of father → PRIMARY [Specific prevent^{n}]

→ Preserving Traditional lifestyle → PRIMORDIAL
Changing life style → PRIMARY

→ Fetal USG → SECONDARY [early Dx]
IFA Pregnancy → PRIMARY [specific protect^{n}]
Folic Acid 3 months before concept^{n} → PRIMARY [Specific protect^{n}]
mobile eye clinic → SECONDARY [early Dx]
Seat belt / Helmet → PRIMARY [Specific protect^{n}]
Monitoring of BP → SECONDARY [early Dx]

→ Best level of Prevent^{n} → Primordial
Best level for NCD [Non Comm. Dz] → Primordial
Best level for TB → Secondary
Best level for Leprosy → Secondary

ICD - 10 [International classificat^{n} of Diseases]

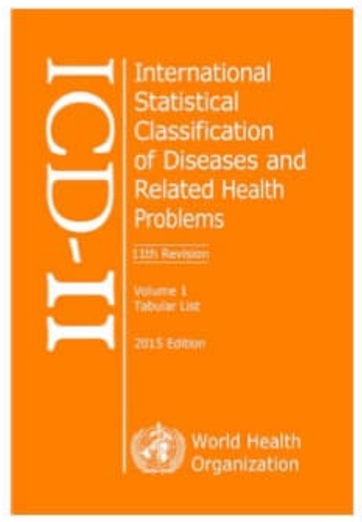
→ 10th edition
→ Revised every 10 years
→ 3 volumes
- I - Classificat^{n}
- II - Instruct^{n} manual
- III - Alphabetical Index

→ 22 chapters

→ ICD-10-CM [Clinical Modificatn] → 3 volumes, 21 chapters
→ unknown etiology of a disease → 'U' chapter or
'R' chapter finally
→ Psychiatric disease → 'F' chapter

ICD-11 [2018]
→ 3 volumes
- I - Tabular list
- II - Reference guide
- III - alphabetical index

→ chapter 26 and V, X



SPECTRUM OF A DISEASE

Disease
Impairment → loss of any anatomical/physiological/psychological functn
Disability → unable to perform Routine activity [according to age & Sex]
Handicap → unable to fulfil social Role

RTA [Road Traffic Accident]	→	Disease	← Diabetes
Loss of Hand	→	Impairment	← Erectile Dysfunctn
Can not DRIVE	→	Disability	← No sexual Activity
unemployment	→	Handicap	← Divorce

CASES

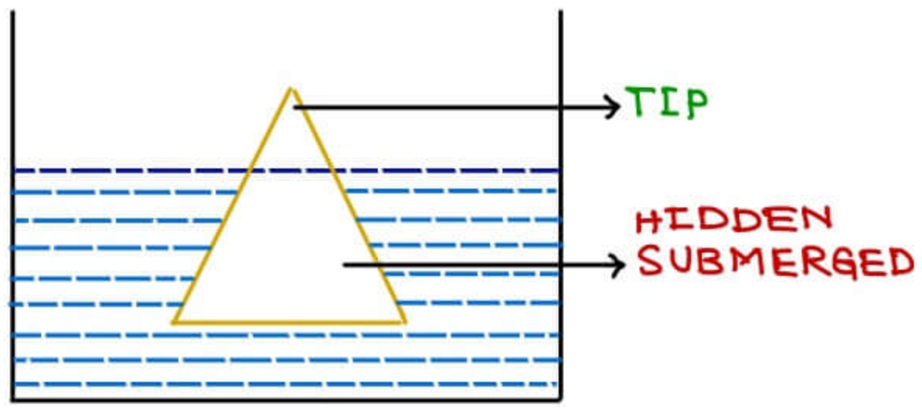
Primary case → first case of a Disease
Secondary cases → All cases who develops from Primary case
Index case → first case that 'comes to notice of Investigator' [primary/sec]

Incubation Period → Time interval between Entry of organism till 1st sign/symptom
Median IP → Time taken for 50% cases to occur
Serial Interval → Interval/gap b/w primary & secondary case
Generatn Time → Time gap b/w Entry of organism till max. infectivity
Latent Period → Time period b/w onset till first detectn
corresponding term to IP for non communicable diseases

CARRIERS

Contact → carrier who develops infectn from a case
Paradoxical → develops infectn from another carrier
Chronic → carrier who sheds > 6 months
Incubatory → sheds organism even in IP
Convalscent → sheds organism even in Recovery
Pseudo → carrier of avirulent organisms

ICEBERG PHENOMENON



→ Tip
- → Clinical cases } Apparent cases
- → Diagnostic tests used
- → secondary level of preventⁿ

→ Hidden/submerged
- → Carriers — Latent, Preclinical, Subclinical } In Apparent cases
- → Screening is used
- → secondary level of preventⁿ

→ Line of Demarcatⁿ
- → lies between Inapparent & Apparent cases

→ No carriers
- → No Iceberg Phenomenon
  - Measles, Tetanus, Rubella, Pertussis, Rabies

→ Iceberg phenomenon is a Dynamic phenomenon [keeps on changing]

STANDARD OF LIVING

→ Depends on

H	Housing	H	Health
I	Income	E	Educatⁿ
S	Sanitatⁿ	R	Recreatⁿ
O	Occupatⁿ	O	Others
N	Nutritⁿ		

SOCIO ECONOMIC INDICATORS

He	Housing
Fl	Family Size
A	Available per capita calorie
G	Growth Rate
G	GNP
E	unEmployment
D	Dependency Ratio

CFR [case fatality Rate]

→ $\frac{\text{Deaths}}{\text{Cases}} \times 100$

→ Proportⁿ

→ CFR JE [Japanese Encephalitis] → 35%.

→ measure of virulence of organism [killing power]

→ Limitatⁿ

- Only for acute Diseases
- Time interval not specified

SULLIVAN'S INDEX

→ DFLE – Disability free Life Expectancy

DALY

→ Disability Adjusted Life year

→ years lost dlt disability or pre mature death of a person

→ Best indicator of Disease burden in a community

INCIDENCE

→ $\frac{\text{No. of New cases}}{\text{total populatⁿ at risk}} \times 1000$

→ Rate

PREVALENCE

→ $\frac{\text{NO. OF New + Old cases}}{\text{total populatⁿ}} \times 100$

→ proportⁿ

→ always expressed in percentage

→ Prevalence = Incidence x Mean duratⁿ of Disease

Q A New Drug does not cure but reduces Complications & death. what will happen to incidence & Prevalence

→ Incidence → same
Duratⁿ → ↑ses
prevalence → ↑ses.

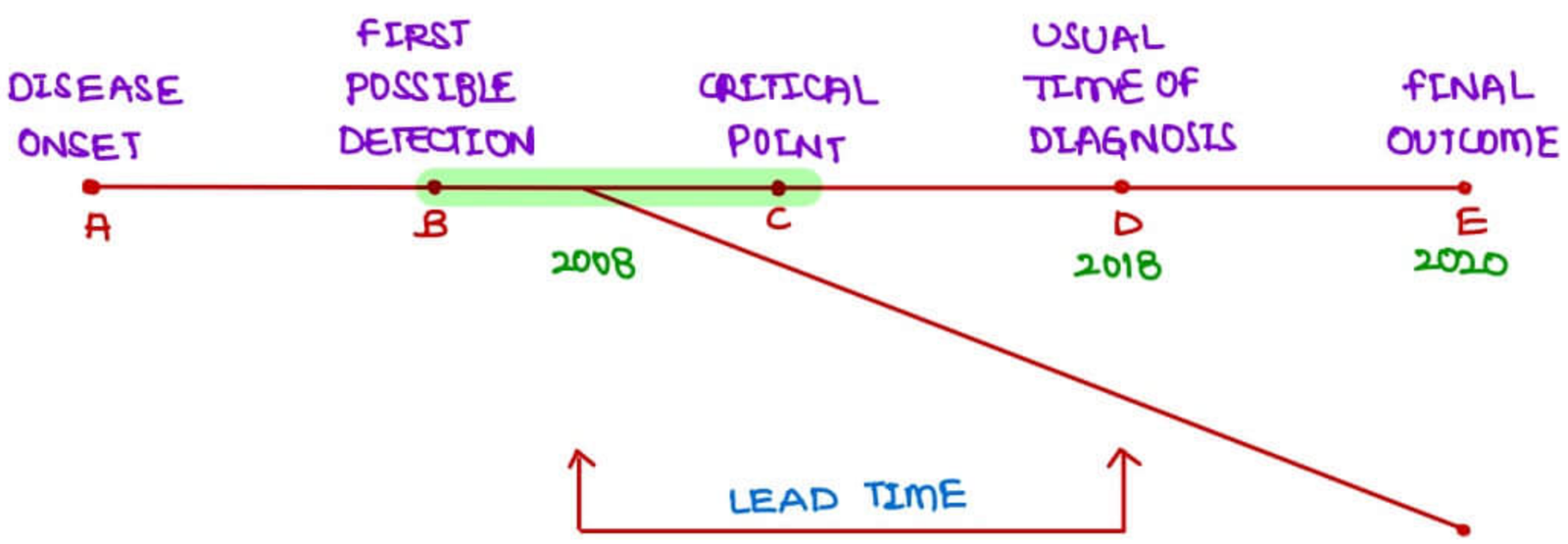
SCREENING OF DISEASE

DEFINITIONS

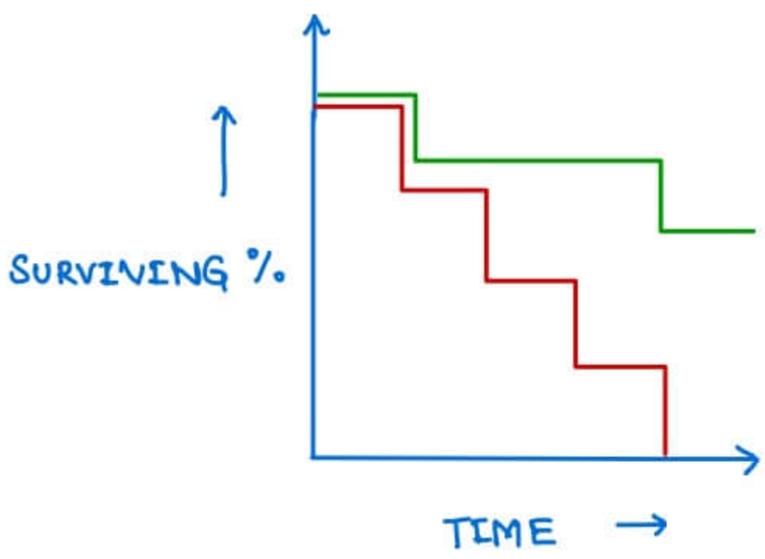
Screening → Search for an UNRECOGNISED Disease or Defect in APPARENT HEALTHY by means of RAPIDLY APPLIED TESTS

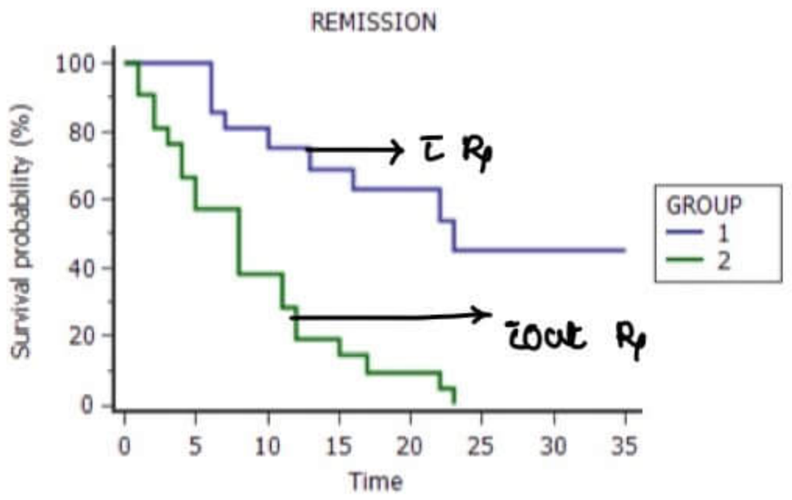
	SCREENING	DIAGNOSIS
DONE ON	→ Apparently healthy	→ cases
APPLIED ON	→ Populations	→ Individuals
TEST RESULT	→ final	→ Not final
BASED ON	→ one criteria	→ Signs/symptoms, CIF
COST	→ cheaper	→ expensive
TIME	→ faster	→ Time consuming
ACCURACY	→ Inaccurate	→ Accurate
BASIS OF R_x	→ ×	→ ✓

WHY TO DO SCREENING



SURVIVAL ANALYSIS





KAPLAN MEIYER ANALYSIS

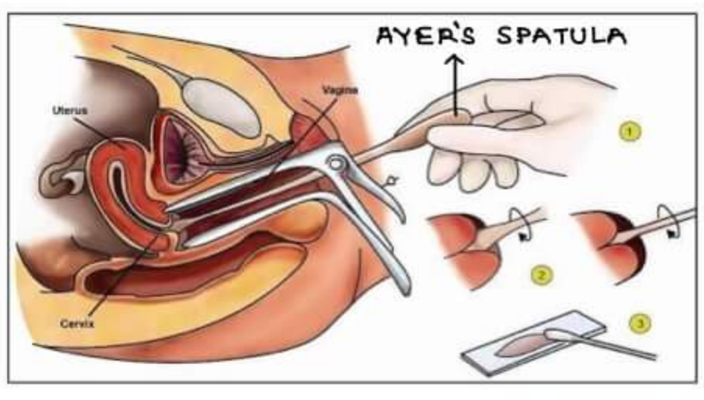
→ COLONIC CANCER has highest 5 year survival post screening.

NHP EXAMPLES

	SCREENING	DIAGNOSIS
TB	→ Cough > 2 WKS	→ Sputum Smear Ex. – AFB – ZN STAIN
MALARIA	→ Fever	→ PBS for MP – JSB Stain
LEPROSY	→ hypoanesthesia	→ Clinical Examinat^{n}
HIV	→ ERS [ELISA RAPID SIMPLE]	→ Western Blot Assay
BREAST CA	→ mammography [Best]; not useful in <35yr Thermography USG BSE [least useful] [recommended in young] Palpat^{n} by Physician MRI [ideal in younger females]	→ FNAC Biopsy
CERVICAL CA	→ Visual Inspect^{n} ± 5% Acetic Acid [VIA] > PAP Smear	→ colposcopic punch Biopsy
PROSTATE CA	→ Prostatic Specific Antigen + DRE > PSA DRE	→ Biopsy
LUNG CA	→ Chest x Ray	→ Biopsy, CT Scan
ORAL CA	→ Bi Manual Oral P	→ Biopsy
DIABETES	→ RBS	→ FBS > 126 mg/dl OGTT > 200 mg/dl HbA$_{1}$C > 6.5%

TYPES OF SCREENING

- MASS SCREENING → applied on large populat^{n}; Eg : CXR in elderly
- HIGH RISK / SELECTIVE S. → applied on high risk group; Eg : Commercial sex workers
- MULTIPHASIC SCREENING → ≥ 2 tests to large no. of people, Eg. Annual health check ups
- MULTI PURPOSE SCREENING → >1 test applied for >1 disease, Eg. HIV, HBV, HCV in preg. ♀
- OPPURTUNISIC SCREENING → Screening of RHD in School children



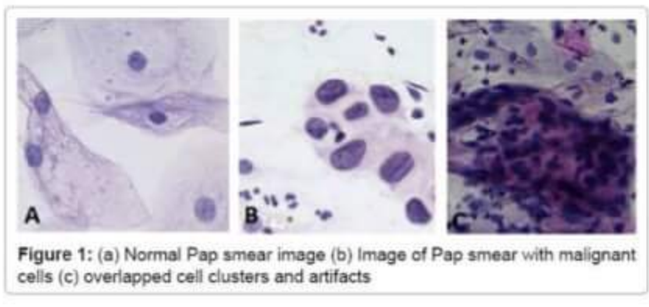
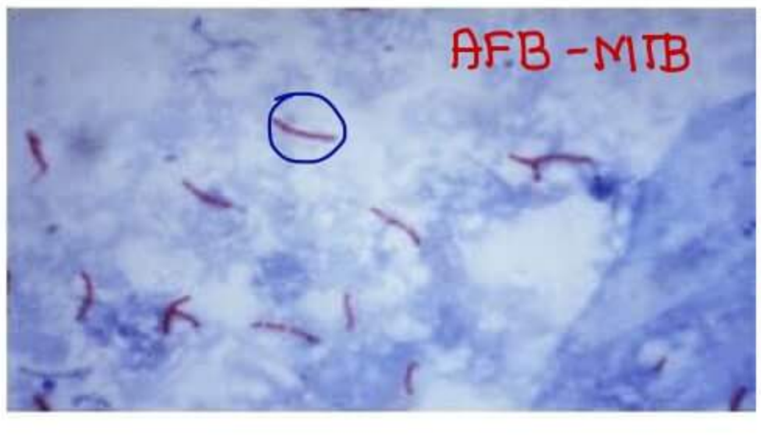
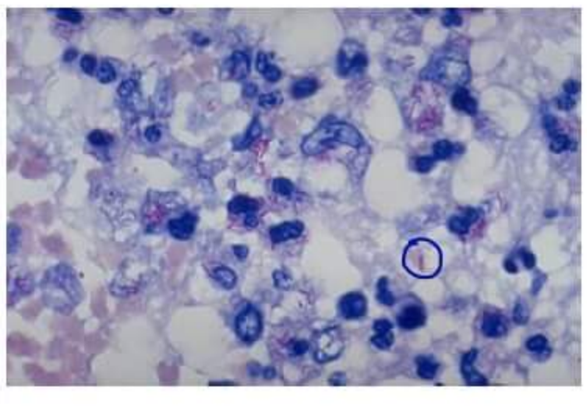


Figure 1: (a) Normal Pap smear image (b) Image of Pap smear with malignant cells (c) overlapped cell clusters and artifacts



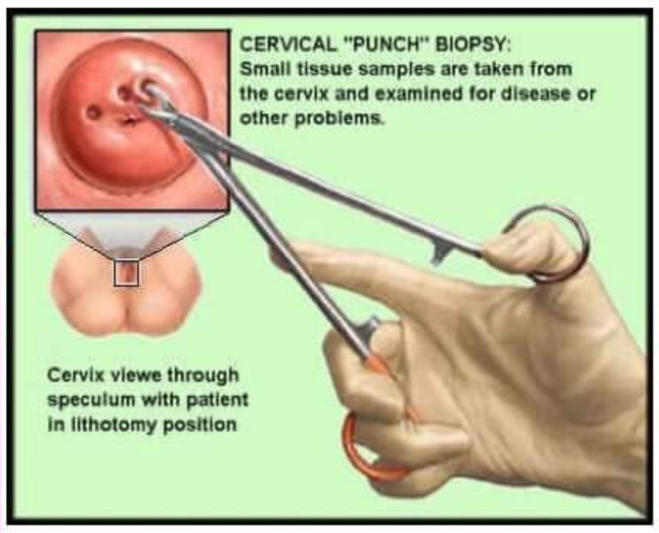


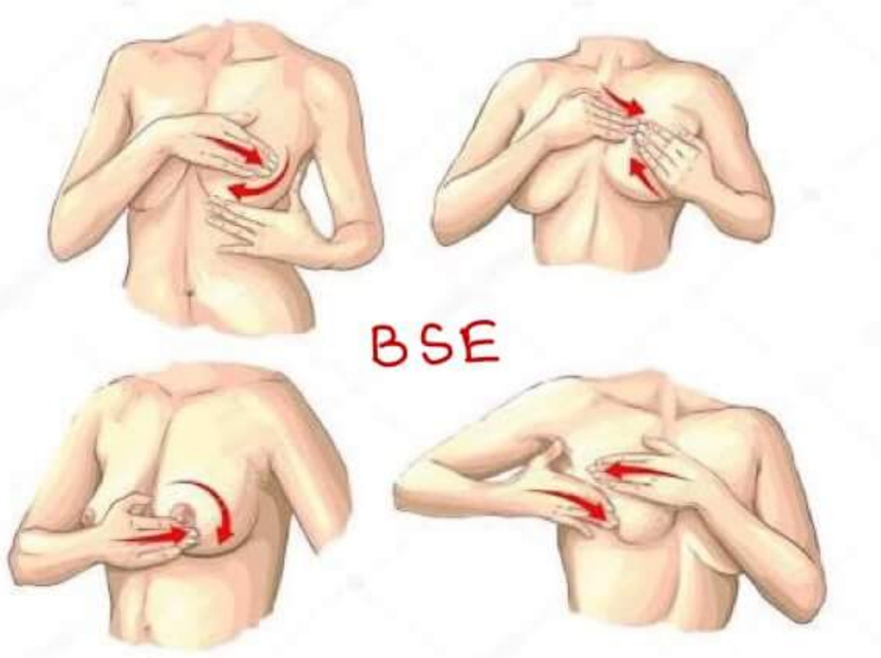
→ Single
→ Rod shaped
→ © beaded appearance

Mycolic Acid

PROPERTIES OF SCREENING TEST

ELISA / HIV	DISEASE ⊕	DISEASE ⊖
Screening Test Results ⊕	(a) TP	(b) FP
Screening Test Results ⊖	(c) FN	(d) TN





SENSITIVITY → $\frac{a}{a+c} \times 100$ $\frac{TP}{TP+FN} \times 100$

SPECIFICITY → $\frac{d}{b+d} \times 100$ $\frac{TN}{TN+FP} \times 100$

PPV [Positive Predictive value] → $\frac{a}{a+b} \times 100$ $\frac{TP}{TP+FP} \times 100$

NPV [Negative Predictive value] → $\frac{d}{c+d} \times 100$ $\frac{TN}{TN+FN} \times 100$

Bi Manual oral palpation for oral cancer

→ out of those diseased, few report positive on ST → $\frac{a}{a+c} \times 100$ → Sensitivity

→ out of those positive on ST, few actually diseased → $\frac{a}{a+b} \times 100$ → PPV

→ Those diseased as well as positive also → True Positive

PREVALENCE → $\frac{\text{Total no. of cases}}{\text{Total population}} \times 100$ → $\frac{a+c}{a+b+c+d} \times 100$

ACCURACY → $\frac{a+d}{a+b+c+d} \times 100$

Q) Sensitivity → $\frac{80}{100} \times 100 = 80\%$

Specificity → $\frac{60}{100} \times 100 = 60\%$

PPV → $\frac{80}{120} \times 100 = 66.6\%$

NPV → $\frac{60}{80} \times 100 = 75\%$

ELISA / HIV	⊕	⊖
⊕	80	40
⊖	20	60

Sensitivity $\propto$ TP

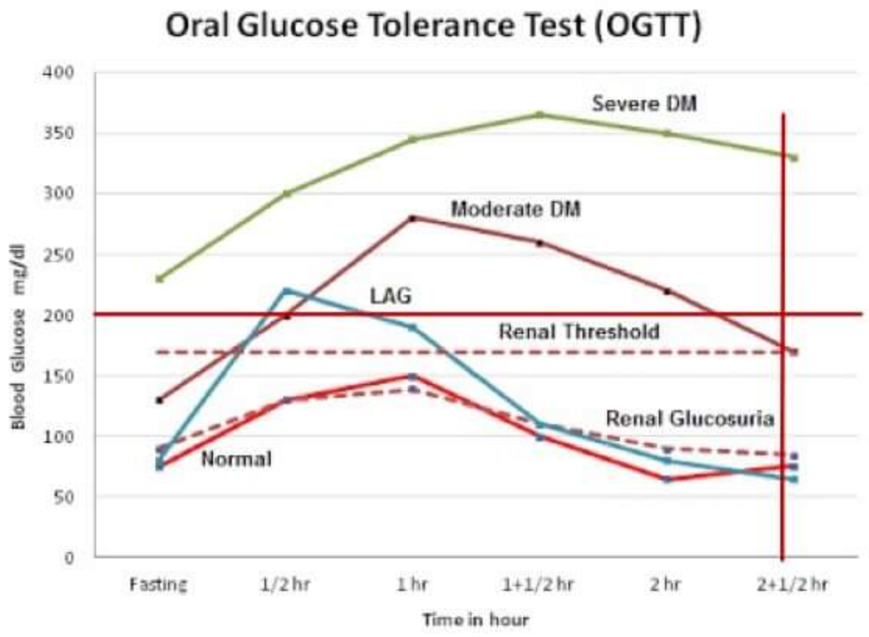
$\propto$ 1/FN

1 − FN

Specificity $\propto$ TN

$\propto$ 1/FP

$\propto$ 1 − FP



Sensitivity − 90% , Specificity − 90% , Prevalence − 10% ; PPV = ?

BAYE'S THEORM

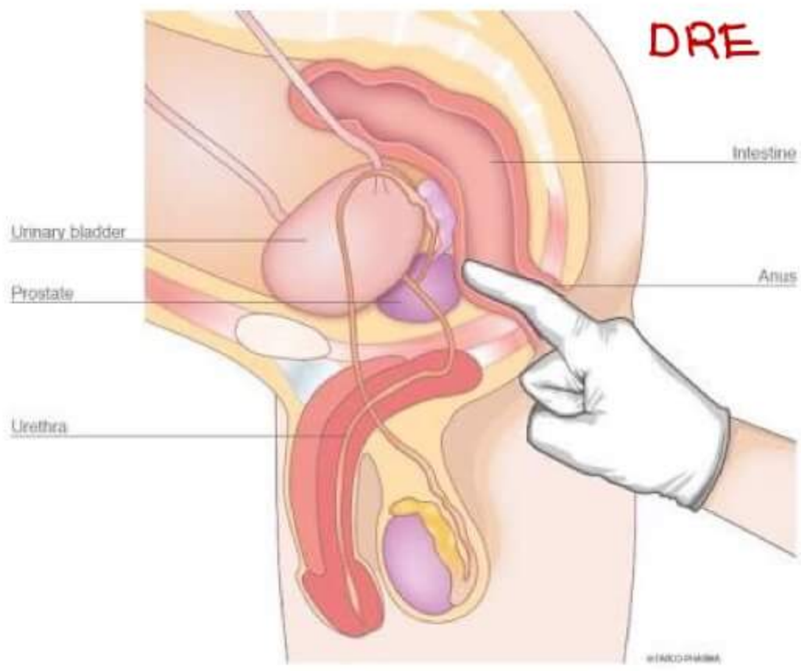
$$PPV \rightarrow \frac{\text{sensitivity} \times \text{Prevalence}}{[\text{Sens} \times \text{Prev}] + [(1-\text{Spe})(1-\text{Prev})]} \times 100$$

→ PPV → $\frac{90 \times 100}{(90 \times 100) + (10 \times 90)} \times 100$ → 50%

use 100 instead of 1

→ STEP 1

		DISEASE ⊕	DISEASE ⊖
Screening Test Results	⊕	a	b
	⊖	c	d



STEP 2 → Total populat^{n} = 1000 [hypothetical]

STEP 3 → Prevelance → 10% → total cases = 1000 × 10% = 100

STEP 4 → Total cases − 100 ; No disease − 1000 − 100 = 900

STEP 5 → sensitivity − 90% ; a = 90 & c = 10 } Reverse calculat^{n}

STEP 6 → Specificity − 90% of b+d = d = 810 ; b = 90 }

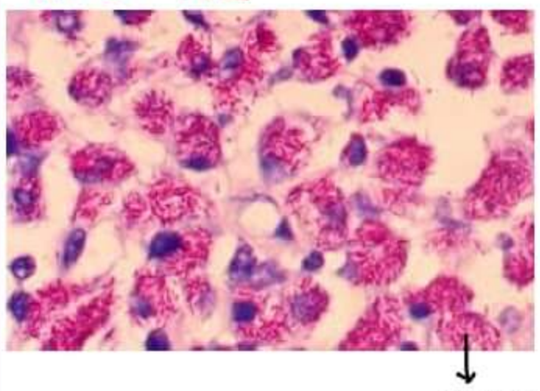
STEP 7 → $\frac{90}{90+90} \times 100 = 50\%$

→ PPV depends on Sensitivity , Specificity , Prevelance

→ Pretest Probability of Disease ≅ Prevelence

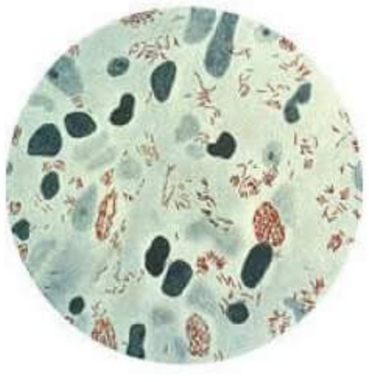
Post test probability ≅ PPV

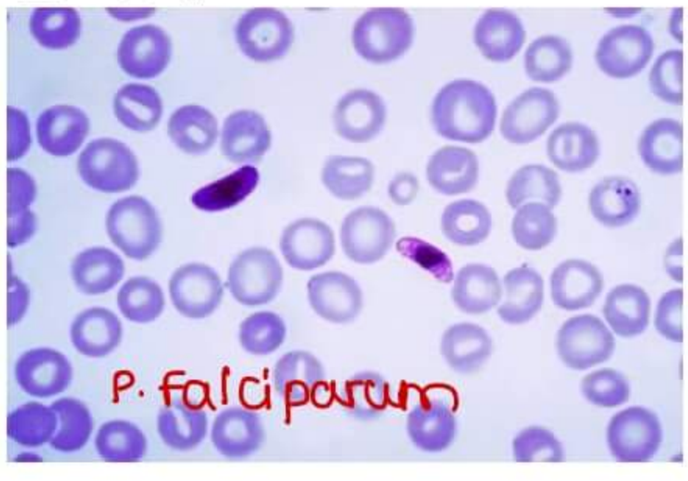
AFB − ML

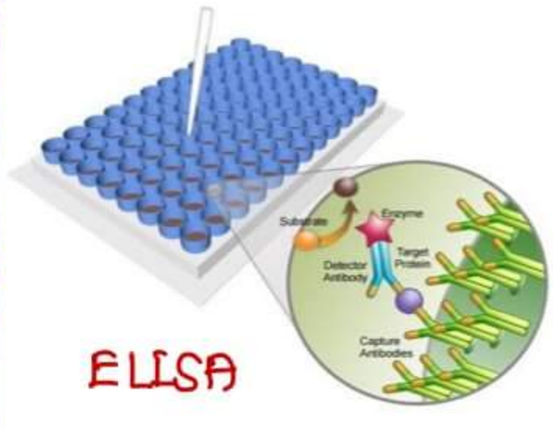


↓

GLOBI ; Non beading







SCREENING TESTS IN

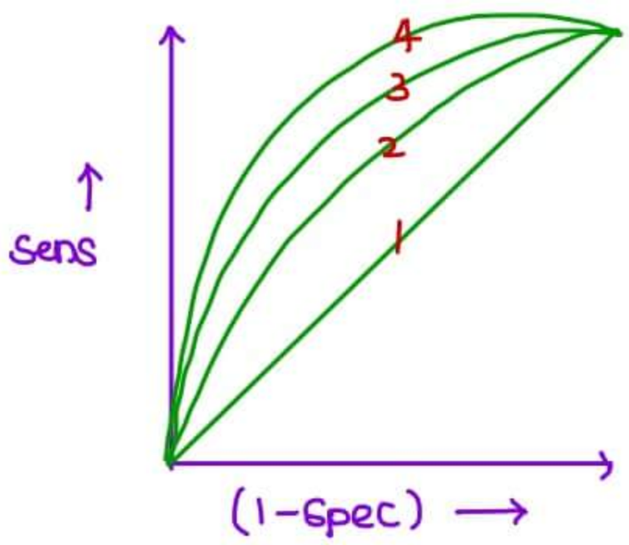
COMBINED	One test [after +ve result] after other — SERIES	Both tests together — PARALLEL
SENSITIVITY	Decreases	INCreases
SPECIFICITY	INCreases	Decreases
PPV	INCreases	Decreases
NPV	Decreases	INCreases

ROC CURVE [RECIEVER OPERATOR CHARACTERISTIC CURVE]

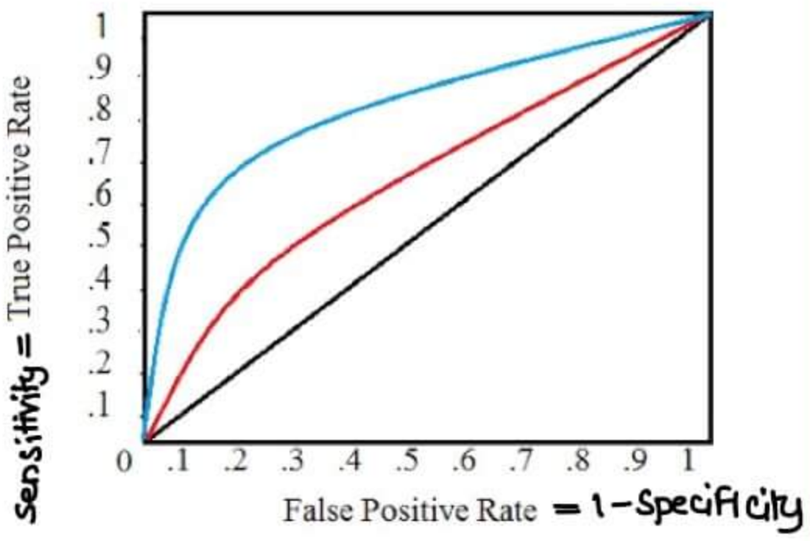
→ Sensitivity $\propto \frac{1}{\text{Specificity}}$

→ TRADING OFF b|w Sensitivity & specificity

→



4. Best
3. Good
2. fair
1. No use



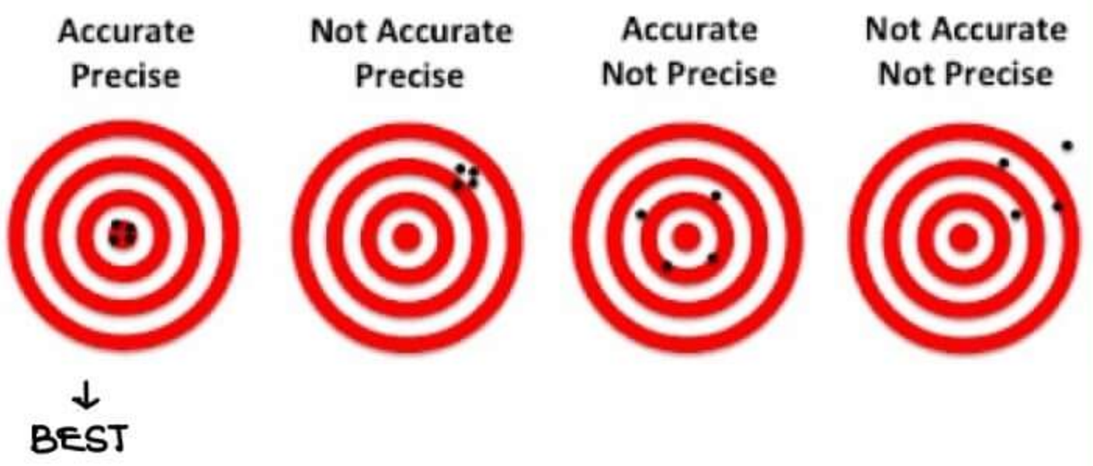
PRECISION VS ACCURACY

Repeatability — close to true/ actual value

consistency

Reproducibility

RELIABILITY [now] VALIDITY [now]



→ Student BP → 120/80

BP Apparatus 1 → 140/96, " } Precise Inaccurate »

BP Apparatus 2 → 140/96, 90/20, 30/20 } Imprecise Inaccurate

BP Apparatus 3 → 120/80, " " } Precise Accurate »»

BP Apparatus 4 → 122/82, 120/80, 118/78 } Imprecise Accurate »

TESTS

PRECISION / RELIABILITY	ACCURACY / VALIDITY
→ R-chart	→ 01. LEVY JENNINGS CHART [LJC]
→ Range chart	02. MEAN CHART
	03. SHEWART CONTROL CHART

DEMOGRAPHY

Demography → Scientific study of human population
1. Size
2. Composit^{n}
3. Distribut^{n}

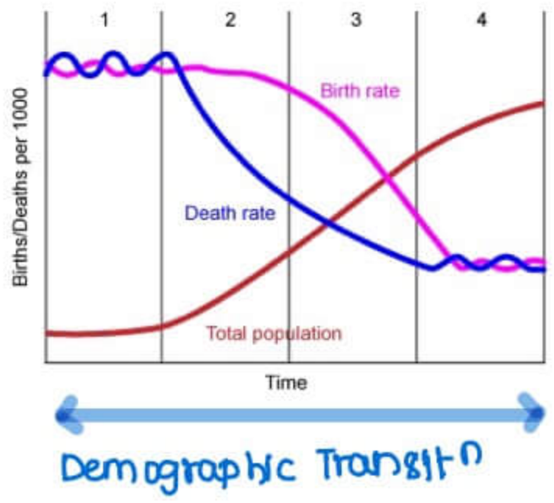
CRUDE BIRTH RATE [CBR] → $\frac{\text{Total no. of Births}}{\text{Total Mid yr popular}^{n}} \times 1000$ → India – 20.2

CRUDE DEATH RATE [CDR] → $\frac{\text{Total no. of Deaths}}{\text{Total mid yr. popular}^{n}} \times 1000$ → India – 6.3

Growth Rate [GR] / DEMOGRAPHIC GAP → CBR – CDR

DEMOGRAPHIC CYCLE

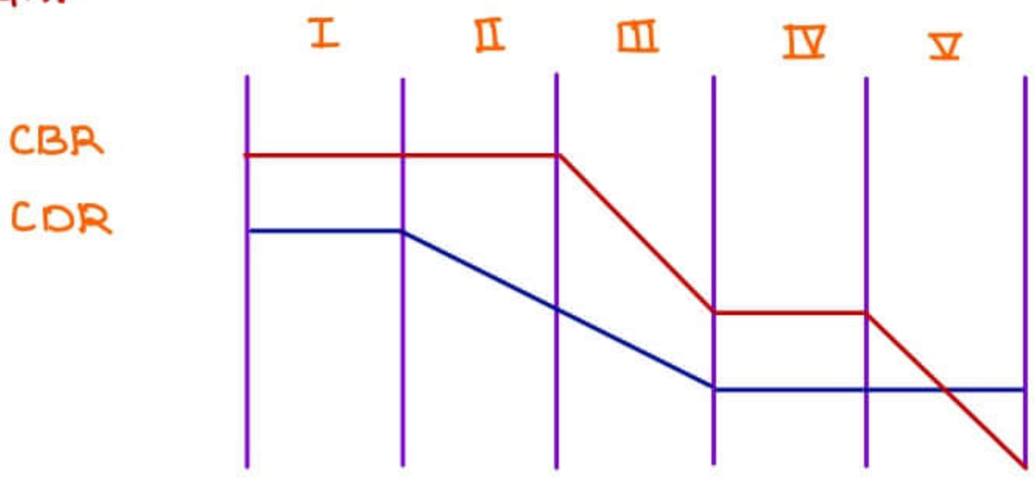
		CBR	CDR
I	High Stationary stage	High	High
II	Early Expanding stage	High	Starts ↓
III	Late Expanding stage	Starts ↓	Already ↓
IV	Low stationary stage	Low	Low
V	Decling Stage	CDR > CBR	

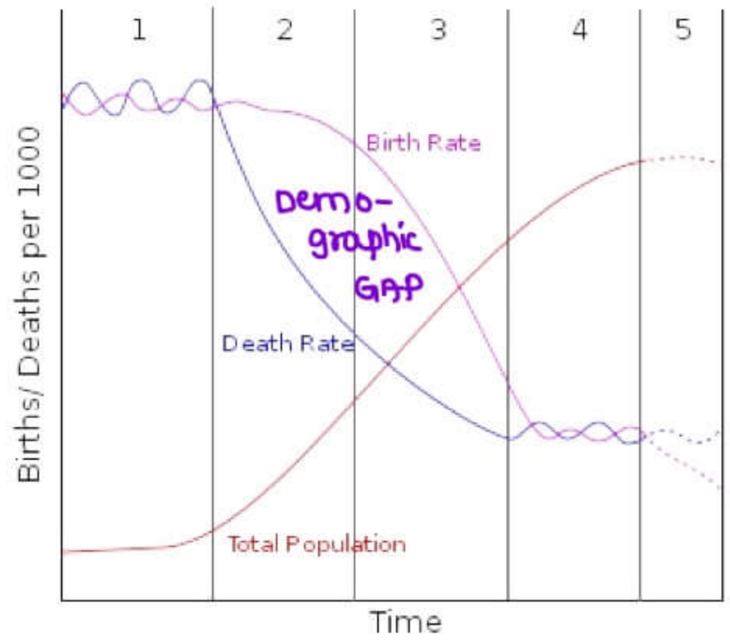


→ India currenlty in Stage III → CBR 30 ↓ 20 CDR 30 ↓ 06

→ Stage V Countries
- Russia, Singapore etc

DEMOGRAPHIC GAP





→ Maximum → Late Stage II
Starts contraction → Early Stage III
Minimum → Stage I & IV
Negative → Stage V

→ Demographic Trasit^{n} → In Economic development, High CBR/CDR → Low CBR/CDR

DEMOGRAPHIC FERTILITY INDICATORS

TFR [Total fertility Rate] → Total no. of children born to a ♀ → completed family size

GRR [Gross Reproduct^{n} Rate] → Total no. of Girl children born to a ♀

NRR [Net Reproduct^{n} Rate] → Total no. of Girl children born to a ♀, taking into account their mortality

Q IF TFR ~ 4, GRR ~ ? → 2

→

GRR or NRR ~ $\frac{1}{2}$ TFR

Q If TFR = 2.2, CBR ~ ?

CBR = [BTFR] + 1

= 18.6 per 1000 MYP

→ Goal OF TFR 2.1 by 2017 → current TFR → 2.2

Goal OF NRR 1 by 2017

→ most imp. demographic fertility indicator → NRR

TO achieve NRR 1 → CPR > 60%.

TO achieve NRR 1, ideal Contracept^{n} → Sterilizat^{n} [vasectomy]

GFR [General fertility Rate] ⟶ $\frac{\text{Total Live Births}}{\text{Total women [15-49 yr]}} \times 1000$

CWR [child women Ratio] ⟶ $\frac{\text{Total children [0-4 yrs]}}{\text{Total women [15-49 y]}} \times 1000$

DR [Economic Dependency Ratio] ⟶ $\frac{<15\text{ y} + >65\text{ yrs}\ [\text{Non earning}]}{15\text{-}65\text{ yrs}\ [\text{earning}]}$

Q 0-15yrs – 30%.

>65yrs – 10%.

DR ?

→ $\frac{30\% + 10\%}{60\%} = 0.66 = \frac{66}{100}$

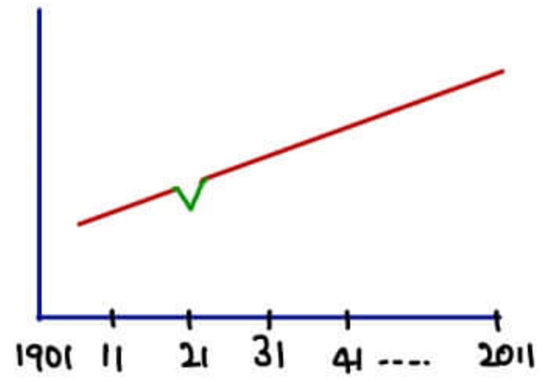
→ 66 non earning popul^{n} dependent on 100 earning popul^{n}

100 Earning popul^{n} is supporting total of (100 + 66) 166 popul^{n}

CENSUS

→ once every → 10 yrs [last @ 2011]
first census → 1871 [15 th II now]
first Disability census → 1881
census stop → 01 march 00.00 Hrs
Big / Great Indian devide → Census of 1921

Big / Great Indian devide → only in 1921 census, we observed decline



→ Ministry → Home Affairs
→ New inclusions in Censur 2011
1. 10 finger prints
2. Iris scan
3. Photograph
4. UID [Aadhar No.]
5. NRC [National Register for citizens]

Sex Ratio

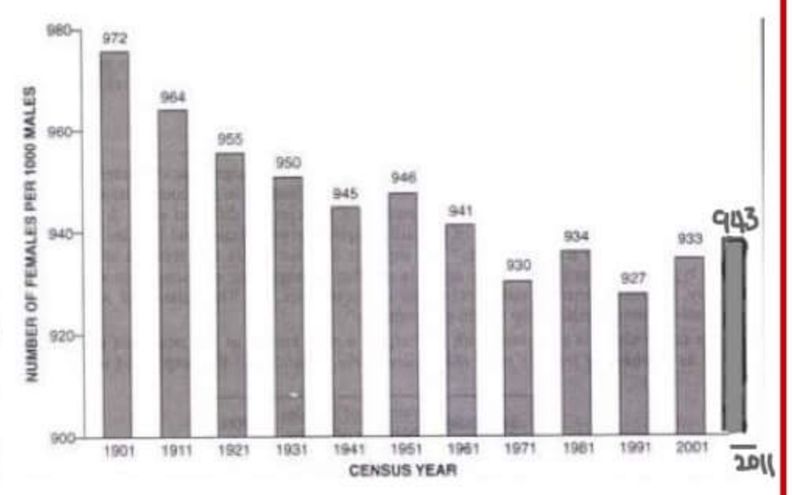
→

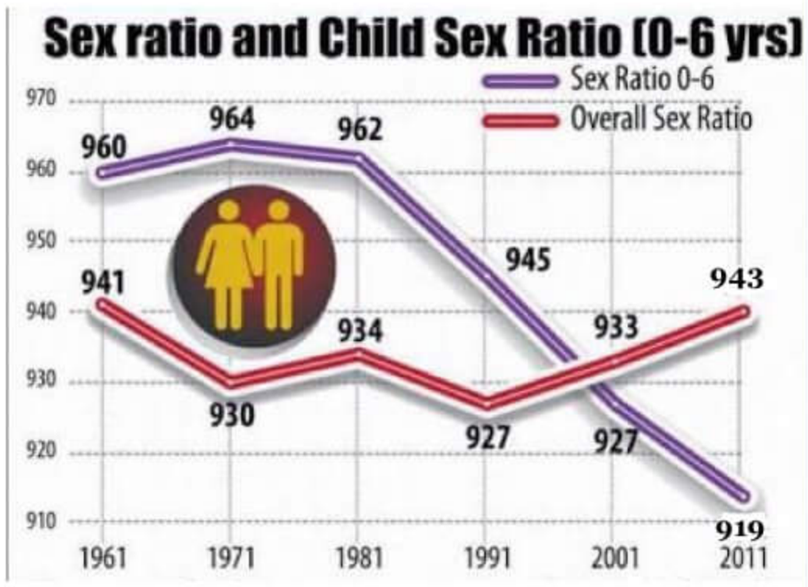
$$SR = \frac{\text{No. of females}}{\text{No. of Males}} \times 1000$$

→ SR India → 943 F / 1000 M [due to female infanticides]
Highest → Kerala → 1084
lowest → Daman & Diu → 680 [union Territory]
Haryana [state]

Q Total populatn 10,000
M : F → 3 : 2, SR → ?

→ $SR = \frac{3x}{2x} \times 1000$ → 666.6 F / 1000 M





Child Sex Ratio

→

$$CSR = \frac{\text{Females (0-6y)}}{\text{Males [0-6y]}} \times 1000$$

→ CSR India → 919
→ Highest → Mizoram
Lowest → Haryana

Literacy Rate

→

$$LR = \frac{\text{Total no. of literates}}{\text{Total pop.} \geq 7\text{yrs}} \times 100 \rightarrow \text{Proportion}$$

→ LR India → 74% [3/4th] → M - 82% [4/5th], F - 65% [2/3rd]

→ Highest → Kerala
Lowest → Bihar
→ Literate → Read, write & understand any 1 language [≥ 7yr age]
→ LR used in → PQLI, HDI, HPI-1

Growth Rate

→ Decadal GR → 17.64%
→ Annual GR → 1.64%
→ India in → Very rapid growth Phase
→ Populatn doubles in 35-47 yrs
→ % Geriatric → 8%
→ % 0-5yrs old → 10%
→ % urban → 31.3%

SAMPLE REGISTRATION SYSTEM [SRS]

→ Once every → 6 months
→ most accurate Data collecting system b/c Only dual record data in India
→ IMR, MMR, U5MR, NNMR, CBR, CDR, GR collected
→ ministry → Home affairs

SRS 2019 LATEST DATA

CBR	20.2 per 1000 mid-year population
CDR	6.3 per 1000 mid-year population
Decadal Growth Rate	13.9%
IMR	33 per 1000 live births
MMR	122 per 100000 live births

III National family Heath survey [NFHS]

→ Once every → 5-6 yrs by International Institute of Populat^n Sciences, Mumbai
Rounds completed → 4

NHFS 1 → 1992-93
2 → 1998-99
3 → 2005-06
4 → 2015-16

NFHS - 4 Data [2015-16]

→ TFR → 2.2
→ ≥ 4 Anti natal visits → 51%
→ Institutional Deliveries → 79%.
→ EBF [Excl. Breast feeding] → 55%.
→ Underweight → 36%.
→ Wasted → 21%.
→ Stunted → 38%.

IV District Level House hold Survey [DLHS]

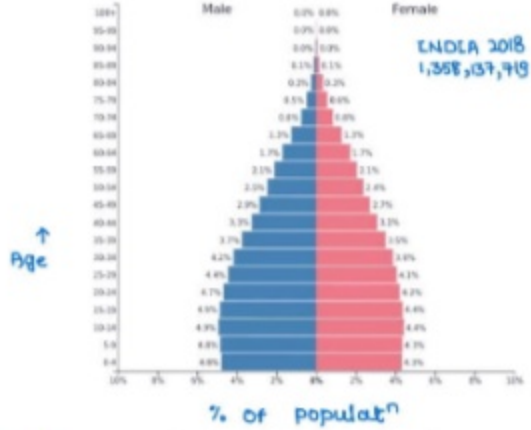
→ Once every → 5yr
→ Rounds completed → 4

DLHS 1 - 1998-99
2 - 2002-04
3 - 2007-08
4 - 2012-13

V VITAL REGISTRATION SYSTEM [VRS]

→ Births → <21 Days
→ Deaths → <21 Days
→ Marriages → 30 Days / 60 Days / 90 Days
→ Child Borne to NRI couple abroad, birth registrat^n done in 60 Days of arrival
→ Birth Registrat^n is responsibility of Hospital

Populat^n Pyramid / Age-Sex Pyramid → Type of double Histogram



1. Shape → Indicative of fertility

Upright Ale, ∴ Broad Base & Narrow Top
Developing countries

Spindle shaped pyramid ∴ bulge in middle
Developed countries

	Developing country	Developed country
2 SPAN → indicates life expectancy	Shorter	Taller
3 Symmetry → indicates Sex Ratio	Asymmetrical	Symmetrical

→ 3's of a populatn pyramid helps in understanding the demographies of a country

PREVENTIVE OBSTETRICS, PEDIATRICS & GERIATRICS

OBSTETRIC CARE IN RCH

→

NFPP (1952) —MCH→ CSSM (1992) —RTI/STI→ RCH (1997)

[NHM - 2013]

NFPP → National family Planning Programme
MCH → Maternal & child health
CSSM → Child survival safe Motherhood
RTI → Reproductive Tract Infections
STI → Sexually Transmitted Infections
NHM → National Health Mission
RCH → Reproductive & child health programme [part of NHM - 2013]

→ OBSTETRIC CARE [EARLIER]

↓

OBSTETRIC & NewBorn Care

- Essential ONC
- Emergency ONC
  - BEMONC [Basic]
  - CEMONC [Comprehensive]

Level I	Level II	Level III
PHCs	24x7 PHCs, CHCs	DH, FRU's

1. Registratn
2. AN care
3. Safe Delivery
4. PN care
5. New Born care

1. Manual Removal of Placenta
2. Oxytocics
3. Antibiotics
4. Anticonvulsants
5. Assisted Delivery
6. Vaccum Aspiratn
7. NB Resuscitatn

BEMONC & 8. Blood transfusn 9. surgery

AN VISITS

→ Recommended AN Visits → 13 - 14

- 0 - 7 months → once a month → 7
- 8th month → Twice a month → 2
- 9th m. onwards → once/ week → 4-5

13-14

→ Minimum AN Visits → ⩾ 4

- 1 → Registration
- 2 → 14 - 26 WKS POG
- 3 → 28 - 34 WKS POG
- 4 → 36 W - Delivery

→ Minimum PN Visits → 3 - 4

- ↳ 3 in Institutional delivery [Day 3, 7, 42]
- ↳ 4 in home delivery [Day 1, 3, 7, 42]

MPW [F] / ANM takes the responsibility of PN visits

ASHA worker Post natal visits seperately → 6-7

- 6 in Institutional delivery → Day 3 7 14 21 28 42
- 7 in home delivery → Day 1 3 7 14 21 28 42

MCH INDICATORS

IMR [Infant mortality Rate] → Infant < 1 yr

MMR [Maternal Mortality Rate] → Maternal Death

Any time in Pregnancy, labour/delivery or < in 42 days of delivery

U5MR [Under 5 mortality Rate → U5 Death → 0-5 yrs

NNMR [Neonatal mortality Rate] → NN Death → 0-28 Days

PNMR [Perinatal mortality Rate] → PN Period → 28 WKS POG ↔ 7 D Postdelivery

SBR [Still Birth rate → Still Birth → POG > 28 WKS

BW > 1000 gms

BL > 35 cm

MCC India

IMR → $\frac{\text{Infant Death}}{\text{Live Birth}}$ x 1000 [33] LBW & Prematurity

MMR → $\frac{\text{Maternal Death}}{\text{Live Birth}}$ x 100 000 [122] PPH — DC → PPH; IDC → Anemia

U5MR → $\frac{\text{Under 5 Death}}{\text{Live Birth}}$ x 1000 [39] LBW & Prematurity

NNMR → $\frac{\text{Neonatal Death}}{\text{Live Birth}}$ × 1000 [24] — LBW & Prematurity

PNMR → $\frac{\text{Peri Natal Death}}{\text{Live Birth}}$ × 1000 [23] — LBW & Prematurity

SBR → $\frac{\text{Still Birth}}{\text{Live Birth}}$ × 1000 [22] — Maternal Infections, Abrupto placenta

IFA TABLETS

	Adult Tablet	Kids syrup
→ Iron	60 mg	20mg
Folic Acid	500 Mg	100 Mg

1 tab/D x 180 Days [4-5-6 m POG] & [Lactation/3m]

1 Bi weekly [6-59 months of age]

TT in Pregnancy

Primi → 2 doses [1 month apart] → ASAP in Pregnancy [No CI in 1st Trim.]
2 doses → Total durath of protecth ~ 5yrs
Next pregnancy occur ī in 3 yrs → Only 1 Booster Dose [ASAP]

→ 1 Dose in Current pregnancy & Next pregnancy with in 3 yrs
→ 2 Doses of TT ASAP [1 months apart]

PEDIATRIC CARE IN RCH

BIRTH WEIGHT

→ Average Birth Weight → 2.8 Kg
→ LBW in India → < 2.5 Kg
→ If pre term Delivery, LBW → < 2.5 kg
[LBW doesn't depend of Gestath Age]
→ minimum sample size required to estimate prevalence of LBW → 500

WHO classificath of LBW

LBW	< 2.5kg
VLBW	< 1.5kg
ELBW	< 1 kg

PRE TERM
<37 WKS

TERM
37-42 WKS

POST TERM
> 42 WKS

LBW → SFD [Small for Date] → < 10th percentile Wt for gest age
SGA [Small for Gest. Age]
• mcc → IUGR

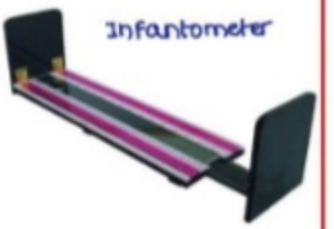
SALTER'S SCALE

→ BW measured by → SALTER'S SCALE [Spring Balance]
→ BW Doubles by → 5 m
Triples by → 12 m
Quadruples by → 2 yrs

BIRTH LENGTH

→ Average BL India → 50 cms
→ Ht at the end of Infancy → 75 cms
→ Ht doubles by → 4 yrs
→ Field instrument → Infantometer

Infantometer



BREAST FEEDING

→ Exclusive Breast feeding till → 0-6 months
Breast Feeding till → 0-2 yrs

→ vaccines [OPV, Rotaviral vaccines]
Medications [ORS also]
Vit B Supplementation
} permitted in Exclusive breast feeding

→ Energy content → 65 Kcal / 100ml
Protein content → 0.9 to 1.1 gm / 100ml

→ most abundant type of Ig → Ig A > Ig D, Ig G, Ig M, Ig E
→ most abundant Ig in colostrum/beestings → Ig A Ig D, G, M, E

→ EFA exclusive to Breast milk → DHA
helps in Brain development [myelination]
→ AA in Breast milk → Taurine [useful in Brain development]

→ vitamin most deficient in Milk → Vitamin C
most def. in Breast Milk → Vitamin D

Breast feeding Initiation Guidlines

→ After a normal vaginal Delivery → ASAP / < 1hr
After a CSection → ASAP / < 4hrs
After a NVD → At the delivery table itself
[Early release of Oxytocin → ↓PPH

Higher Quantities of HUMAN MILK	COWS MILK
Lactose	Energy [67]
Iron	Proteins
Water	Fats
Ca^{2+} : P Ratio	Calcium, Phosphorous
Vit A, C	Vit B, D
Cu, Co, Se	Na^{+}, K^{+}
Cysteine, Taurine	Methionine
Linoleic Acid	
Linolenic Acid	
PUFA	
Casein : Whey [40 : 60]	Casein : Whey [80:20]

GROWTH & DEVELOPMENT & NUTRITIONAL STATUS

BEST Indicators in children

1. Growth → Weight [weight for Age]
Development → Weight [Weight for Age]
Nutritional status → Weight [Weight for Age] > MAC [mid Arm Circumference]

MID ARM CIRCUMFERENCE

→ Field instrument → SHAKIR's TAPE
→ Normal → > 13.5 cm [Green] → Home Mx
mild - mod PEM → 12.5 - 13.5 cm [yellow] → PHC Mx
severe PEM → < 12.5cm [Red] → Referral
→ Age group → 6 m - 5yr


SHAKIR'S TAPE

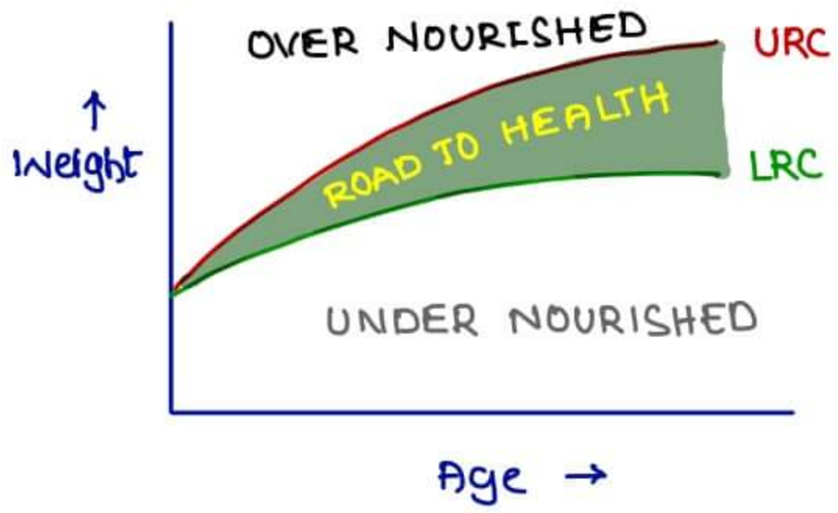
PEM STATUS INDICATORS

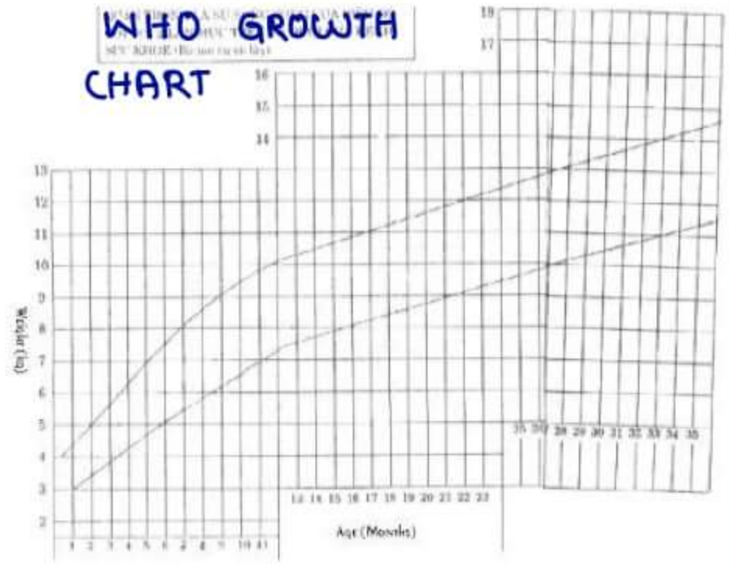
1 Low wt for Age → UNDER WEIGHT → Acute on chronic PEM
2 Low Wt for Height → WASTING → Acute PEM
3. Low Ht for Age → STUNTING → Chronic PEM

GROWTH CHART

→ Passport to child growth
→ Given by DAVID MORLEY
→ > 55 types + nt.

WHO Growth chart

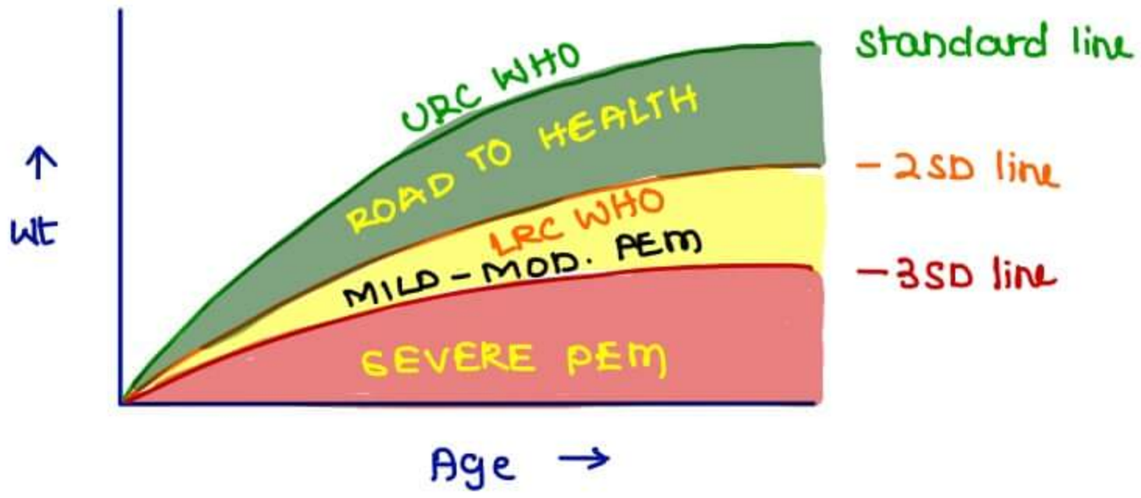


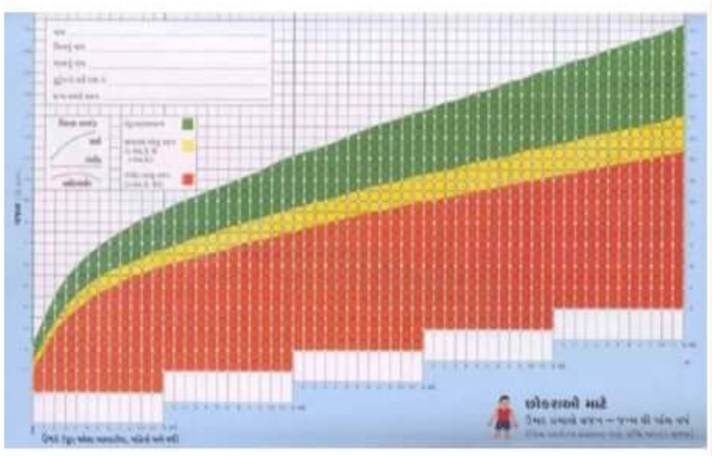


URC - Upper reference curve → 50th percentile for Boys
LRC - Lower reference curve → 3rd percentile for Girls = 80% of URC
lies - 2SD below URC

Based on NCHS [National centre for Health Statistics]

ICDS Growth chart [Integrated child Development services]





Used @ ANGANWADI
Standard line → 50th percentile for Boys
-2SD line → 3rd percentile for Girls

Based on MGRS [Multicentric Growth Reference Study] Standards
- WHO Child Growth Standards 2006.

SCHOOL HEALTH

→ First recommended by BHORE committe [1943]
Comprehensive School Health Programme by RENUKA ROY committe [1960]

HEALTHFUL SCHOOL ENVIRONMENT

1. 1 class room < 40 students
2. Per capita Space > 10 Sq. Feet
3. Door & Windows area > 25% of Floor area
4. Desk - minus type 

5 Natural light from lt side

6 1 urinal / 60

1 Sanitary Latrine/100

7 Recommended frequency OF school Health Examinat^{n} ONCE/ 6 months

SCHOOL VISION SCREENING PROGRAMME

→ screening done by Class teacher

→ 1 Teacher / 150 Students

→ Visual Acuity cut off for Referral → <6/9

PREVENTIVE GERIATRICS

→ Geriatric Age → > 60 yrs

→ Geriatric populat^{n} → 8%.

→ mc health disorder → cataract

mcc of Deaths in >70y → Cardio Vascular Diseases

NUTRITION → Science that studies interactⁿ of nutrients in relatⁿ to the maintainance, growth, repair, health & disease in body

NUTRIENTS

MACRO NUTRIENTS	MICRO NUTRIENTS	TRACE NUTRIENTS
→ grams/ day	→ mg/day	→ µcg/days
→ carbohydrates	→ Iron	
fats	Iodine	
Proteins	Zinc	
	calcium	
	vitamin A	

PROXIMATE PRINCIPLES ≅ MACRO NUTRIENTS

→ carbs, fats, proteins

→ Energy	→	fats [9 Kcal/gm]	> Proteins [4.2 K.cal/gm]	> carbs [4.1 K.cal/gm]
→ Importance	→	Proteins	> fats	> carbs
→ Balanced Diet	→	10-15%	15-30%	50-70%

PROTEINS, FATS, RICH SOURCES

PROTEINS

QUANTITY

1. Protein Energy Ratio

QUALITY

Best indicator - ↓ing order

1. Digestible Indispensable AA Score [DIAAS]
2. Protein Digestibility corrected AA Score [PDCAAS]
3. Net protein Utilizatⁿ
4. Amino Acid score
5. Biological value
6. Protein efficiency ratio

NPU [Net Protein Utilizatⁿ]

→ $NPU \rightarrow \frac{BV \times DC}{100} = \frac{N_2 \text{ Retained}}{N_2 \text{ Intake}} \times 100$

BV - Biological value

DC - Digestibility co-efficient

→ Highest NPU found in Egg → 96
Milk → 81
Meat → 79

→ Highest quality → EGG → REFERENCE PROTEIN
Highest quantity → Soyabean [43.2% protein]

EGG

→ 6g Proteins
6g Fats
1.5mg Iron [Fe^{2+}]
30mg Calcium
250mg Cholesterol
70K.Cal Energy

→ Highest NPU is dlt it contains all Essential Amino Acids in balanced proportions

SOYABEAN [Among pulses]

→ Highest Proteins [43%]
NPU
FAT
Energy [432 Kcal/100g]
Iron
vit B_1, B_2 ...

SOYABEANS

ESSENTIAL AA [EAA]

→ 10 [8+2]

→ P Phenyl Alanine
V VALine
T Tryptophan
T Threonine
I Isoleucine
M Methionine
H Histidine
A Arginine
L Leucine
L Lysine

} semi EAA → Infancy, Adolescence, pregnancy, Lactatn } in these conditions

LIMITING AMINO ACIDS

→ Deficient in a food item
→ Maize → Tryptophan & Lysine
cereals → Threonine & Lysine
Pulses → Methionine & Cysteine
→ supplementory Actn of proteins
- Two different food items must be eaten together

FATS

ESSENTIAL FATTY ACIDS [EFAs]

→ Linoleic Acid → most essential
Linolenic Acid
Arachidonic Acid
Eichosa Pentanoic Acid
Docosa Hexanoic Acid [DHA]

RICHEST SOURCES

Order

→ EFA →
- Safflower oil
- Sunflower oil
- corn oil
- Soyabean oil
- ⋮
- Olive oil
- Groundnut oil
- ⋮
- coconut oil

SUN FLOWER

SAFFLOWER

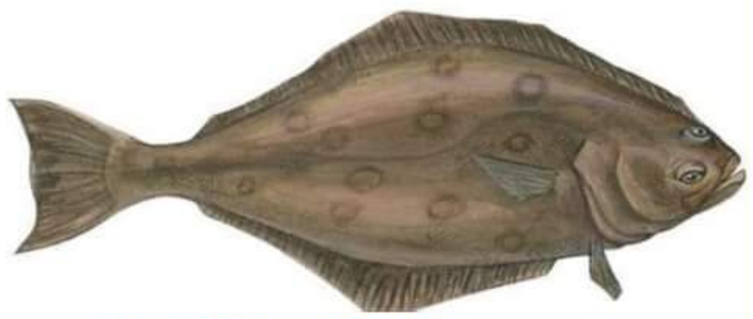
→ Linoleic Acid
Arachidonic Acid
PUFA
} SAFFLOWER OIL

→ MUFA → Olive oil
→ SFA → coconut oil

→ Linolenic Acid → Flaxseed oil
Soyabeen oil

→ EPA → Fish oils

→ Iron → Dried Pumpkin seeds
Pistachio Nuts
Cashew nuts



HALIBUT FISH

→ Vitamin A
- overall → Halibut fish liver oil, other fish liver oils.
- fruits → Riped mango
- Vegetables → carrots

→ Vit D
- overall → fish liver Oil [Halibut]
- fruits → ×
- vegetables → ×

• NO Plant soura → vit D, vit B_{12}

• Strict vegetarians develop deficiency OF B_{12}

→ Vit C
- 1. Amla [Indian Gooseberry]
2. Guava [Non citrus]
3. Cabbage [vegetable]
4. Other citrus fruits

→ GOLDEN RICE
- Genetically modified crop [GMC]
- rich in Iron & β carotene

polished Rice Golden Rice

POOR SOURCES

→ EGG → carbohydrates & vit C
Milk → Iron & vit. C
Meat → calcium
fish → carbohydrates & Iodine

RDA, NUTRITIONAL REQUIREMENTS

RDA [Recommended Dietary Allowance]

→ Nutritional requirement for any nutrient that can satisfy the needs of 97.5% populatn.

→ All Nutrients → Actual Requirement + some extra
Energy → Actual Requirement + No extra

→ REFERENCE INDIAN	MAN	WOMAN
Age	18-29yr	18-29yr
Weight	60kg	55 kg
Height	1.73 m	1.61 m
BMI	20.3	21.2
Activity levels	8hrs of sleep	
	8hrs of moderate work	
	4-6 hrs of sitting / moving	
	2hrs of walking / Recreatn	

ENERGY REQUIREMENTS

	MAN	WOMAN	
Sedantary	2300	1900	Kcal/D
Moderate	2700	2200	Kcal/D
Heavy	3500	2900	K.cal/D

PROTEIN REQUIREMENTS

MAN	WOMAN	
0.83	0.83	g/kg/day

ENERGY REQUIREMENTS

INFANTS

	0-6 m	6-12m
k.cal/kg/D	92	80
K.cal/D	500	670

PROTEIN REQUIREMENTS

INFANTS

	0-6m	6-12m
g/kg/D	1.16	1.69

ADDITIONAL ENERGY REQUIREMENTS [Kcal/D]

Pregnancy + 350

Lactatn

0-6m + 600

6-12m + 520

	Iron mg/D		Folic Acid Mcg/D	Calcium mg/D	Vit A Mcg/D Retinol	IODINE Mcg/D	FLUORINE mg/Ltr = ppm
	ACTUAL Requirement	Recommended Intake					
Man	0.8	17	200	600	600	150	0.5-0.8
Woman	1.6	21	200	600	600	150	0.5-0.8
Pregnancy	2.8	35	500	1200	800	250	0.5-0.8
Lactatn	1.6	21	300	1200	950	220-290	0.5-0.8 optimum level

→ Fluorine → Double edged sword

→ FOLIC ACID REQUIREMENTS for Adolescents → 400 Mcg/D

→ Calcium Requirements for Infants → 500 mg/D

→ Vit A Requirement for Infants → 350 Mcg/D

→ Sodium requirement → 2000 mg/D
→ Potassium requirement → 3500 mg/D
→ Zinc requirement → 10-12 mg/D
→ Vit K requirement → 0.03 mg/kg/D

NUTRITIONAL DEFICIENCIES

VITAMINS & DEFICIENCIES

VITAMIN A DEFICIENCY - XEROPHTHALMIA

→ Vit A deficiency leads to XEROPHTHALMIA [WHO]
→

Primary

X1A → Conjunctival xerosis
X1B → Bitot Spots
X2 → corneal xerosis
X3A → corneal ulcerat^{n}
X3B → Keratomalacia

Secondary

XN → Night blindness | nyctalopia
XF → Fundus
XS → Scarring

→ First sign → Conjuctival xerosis / Dry Eye
First Symptom → Night blindness
first manifestat^{n} → Night blindness
most specific manifestat^{n} → Bitot's Spots

DRY EYE of vit A deficiency → Receding banks after a seatide

→ Xerophthalmia as a public health problem
1. ↑ prevalence of night blindness > 1%
2. ↑ prevalence of Bitot's Spots > 0.5%

→ Rx of Xerophthalmia

	≥ 1 year	< 1 year	
Day 0	2 lakh IU	1 lakh IU	} oral dose
1	2 lakh IU	1 lakh IU	
>14	2 lakh IU	1 lakh IU	

→ 1 Lakh IU = 30 mg
→ Im dose = 1/2 the oral dose

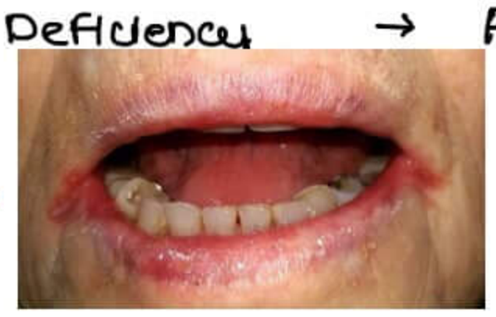
VITAMIN B1 [THIAMINE]

→ Deficiency leads to
1. Beri Beri → Seen in Polished rice eaters
2. Wernicke's Korsakoff Psychosis → Seen in Alcoholics

VITAMIN B_2 - RIBOFLAVIN

→ Deficiency → Ariboflavinosis [Δ]

CHEILOSIS →



- Cheliosis
- Angular stomatitis [most characteristic]
- Atrophic Glossitis / Geographic tounge

VITAMIN B_3 - NIACIN

→ Deficiency ⟶ PELLAGRA

- Seen in Maize eating populatⁿ
- TRYPTOPHAN ⟶ B_3
  60mg ↑⊖ 1mg
  Leucine excess
  [Pellagrogenic AA]

- 3D's
  Diarrhoea
  Dermatitis
  Dementia

4ᵗʰ D - Death
5ᵗʰ D - Delirium
6ᵗʰ D - Depression

VITAMIN B5 - PANTOTHENIC ACID

→ Deficiency leads to BURNING FEET / SOLE SYNDROME

VITAMIN B6 - PYRIDOXINE

→ Deficiency → microcytic anemia
Peripheral neuritis

→ Seen in Isoniazid takers [OF RNTCP] → supplement ĩ B6

VITAMIN B9 - FA

→ Deficiency leads to
1. Megaloblastic Anemia
2. Neural tube defects

VITAMIN B12 - CYANOCOBALAMIN

→ Deficiency leads to
1. megaloblastic anemia
2. pernicious anemia
3. Peripheral neuritis
4. SCDSC [Subacute Combined Degenerat^{n} of Spinal Cord]

VITAMIN C - ASCORBIC ACID

→ Deficiency leads to SCURVY
- CIF
- delayed wound healing
- Gum bleeding
- fractures

VITAMIN D - Ergocalciferol [D_2], cholecalciferol [D_3]

→ Deficiency → RICKETS [children]
Osteomalacia } [Adults]
Osteoporosis }

NUTRITIONAL DEFICIENCIES

→ B_2 deficiency [ocular]	→	↑ circum corneal congestⁿ
→ Zn deficiency	→	Acrodermatitis enteropathica
→ vit B6 deficiency	→	Seizures [infants]
→ vit E deficiency	→	Progressive external Ophthalmoplegia
→ Chromium deficiency	→	Glucose Intolerance
→ Zn deficiency		Impaired Glucose Metabolism
→ EFA deficiency	→	PHRYNODERMA [Toad like skin]
→ Selenium deficiency	→	Endemic Cardiomyopathy of India [KESHAN'S DISEASE]

FLUORINE

→ mc source	→	Drinking water
→ Optimum level of intake	→	0.5 - 0.8 ppm
Acceptable level of intake	→	1 - 2 ppm
Dental Fluorosis	→	> 1.5 ppm
Skeletal fluorosis	→	3-6 ppm
Crippling fluorosis	→	> 10 ppm

→ Fluorosis dlt excess of fluorine

Defluoridatⁿ of water

1. NALGONDA Technique
   - Developed by NEERI NAGPUR [National Environmental ENG. Research Ins.]
   - sequence
     - L Lime
     - A Alum
     - B Bleeching Powder
2. PHOSPHATES

→ First fluorine changes in body → Upper central Incisors & 1st molar

FOOD STANDARDS & FOOD ADULTERATION

FOOD STANDARDS IN INDIA

1. CODEX ALIMENTARIUS [International]
2. PFA Standards [Prevent^{n} of food Adultrat^{n} 1954 Act]
3. BIS Standards [Beuro of Indian Standards]
4. AgMark Standards
5. FSSA Standards [food standards & safety authority]

NIN, HYDERABAD

→ Indian food standards mainly based on Codex Alimentarius
→ Minimum prescribed food Standards in India → FSSA standards

FOOD ADULTRATION

→ Deliberate addit^{n}, delet^{n} or substitut^{n} (OR)
mismatch b/w actual contents & those mentioned on food pockets

FOOD ADULTERAT^{n} DISEASES

Disease	Toxin	Adulterant	food
Lathyrism	BOAA [β oxylyl Amino Alanine]	Kesari Dal [L.sativus]	Arhar Dal
Epidemic Dropsy	Sanguinarine	Argemone oil	mustard oil
Endemic Ascitis	Alkaloids [pyrollizidine]	Crotolaria	Food dishes
Ergotism	Ergot toxin	claviceps	cereals
Aflatoxosis	Aflatoxin	Aspergillus	Ground nuts

ADULTERANTS

→ Blackpepper → Dried Papaya seeds
Red pepper → Brick powder
Turmeric → Lead chromate
coriander powder → cow dung


DRIED PUMPKIN SEEDS


Lathyrism

HEALTH ECONOMICS

GDP [Gross Domestic product] → Gross Income Generated every year
NDP [Net Domestic product] → GDP − Depriciat^{n}
GNI [GNP] [Gross National Income / Product] → GDP + Income recieved from abroad
NNP [Net National Product] → GNI − Capital we consume

HEALTH EXPENDITURE

Total, as % of GDP in India → 4.7%.
Public, as % of GDP in India → 1.3%.
Out of pocket, as % of GDP in india → 3.4%.

Real GDP per Capita Economic Growth Rate → 5%.

CULTURE → Learned behavior, which is socially acquired [not present from birth]

ACCULTURATION → mixing of 2 cultures ["cultural contact"]
→ occurs by
- Educatⁿ
- Trade & commerce
- Marriage
- conquest of one country by another

CUSTOMS → Established patterns of behavior relevant for a particular social setting
- → FOLKWARES → less stringent customs [less vital areas of conduct]
- → MORES → MORE stringent customs [PURDAH system]

THEORIES OF DISEASE CAUSATⁿ in SOCIOLOGY

1. MARXISTTH THEORY → Disease occurs in a society due to putting profit ahead of health
2. PARSONIAN THEORY → Disease occur dlt social constraints which arise dlt social demands
3. FEMINIST THEORY → Disease occur dlt Role of women enforced by men
4. FOUCALDIAN THEORY → Disease occurs so that populatⁿ is seggregated into groups, making them easier to control
5. McKNEDWN THEORY OF TB → Whatever reductⁿ of incidence / prevelance of TB is only dlt socioenvironmental conditions.

PSYCHOLOGY

OPINION → TEMPORARY PROVISIONAL views on any point of debate → SUBJECTIVE

BILIEF → PERMANENT, STABLE, ALMOST UNCHANGEABLE views → SUBJECTIVE

ATTITUDE → MORE OR LESS PERMANENT WAYS OF BEHAVIOR, BASED ON ORGANIZATⁿ OF BELIEFS ON OBJECT/ PERSON/ SITUATION → OBJECTIVE

HABITS → Accustomed ways of doing things
- → Acquired through repetitions
- → Automatic
- → performed in special circumstances

EMOTIONS → Strong feelings that motivate human behavior
- → mc type emotⁿ → FEAR

LEARNING → Any relative permanent behavior change that occur d/t practice/experience

→ Learning Types — Associations

C	Cognitive	K	Knowledge
A	Affective	A	Attitudes
P	Psychomotor	S	Skills

MENTAL RETARDATN

→ IQ level = $\frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$

→ IQ < 70 = Mental retardatn

FAMILY SYSTEMS IN INDIA

FAMILY

Family cycle

1. formatn → from marriage till 1st child birth
2. Extensn → from 1st child birth till last child birth
3. completed Extensn → from last child birth till 1st child leaves home
4. contractn → from 1st child leaves home till last child leaves home
5. completed contractn → from last child leaves home till death of 1st spouse
6. Dissolutn → from death of 1st spouse till death of survivor [Extinction]

FAMILY TYPES

NUCLEAR FAMILY

→ married couple ± four dependent children

JOINT FAMILY

→ more than one married couples & their children living in the same house hold
→ common pool of Income ⊕
common Kitchen ⊕
common property ⊕
→ Authority vested in a senior member

3 GENERATN FAMILY

→ Household ± members of 3 successive generatn
→ Type of Joint family
→ Males related by blood [in Joint family also]

NEW FAMILY [RCH]

→ family ± marriage duratn < 10 yrs

COMPLEX FAMILY

→ family structure involving > 2 adults
→ Extended family or polygamy

COMMUNAL FAMILY

→ All members of the family play a difined role in the management of family
→ "DIVISION OF LABOUR"

CONJUGAL FAMILY

→ Nuclear family, where relationships focussed inwardly & ties extended to kin are voluntary

BROKEN FAMILY

→ Both parents are seperated or death has occured of one/both parents

PROBLEM FAMILY

→ Family lags in progress behind rest of the community
→ dlt relationship problems, poverty, Illness

SOCIO ECONOMIC STATUS & SOCIAL SECURITY

SOCIO ECONOMIC STATUS SCALES [SES SCALES]

1. URBAN

→ Modified Kuppuswami scale
→ Kulshrestha Scale
→ Srivastava Scale
→ Jalota Scale

2. RURAL

→ Udai Pareek Scale
→ Modified BG Prasad scale
→ Radhukar scale
→ Shirpurkar scale

3. STUDENT'S SCALE

→ Bharadwaj Scale

4. Non - Indian

→ Hollingshead Scale
→ Henderson Scale

MODIFIED KUPPUSWAMI SCALE

→ Components

Income	→	Family members
Educatⁿ	→	Head of family
Occupatⁿ	→	Head of family

→

	Upper	→	26 - 29
Upper	Middle	→	16 - 25
Lower	Middle	→	11 - 15
Upper	Lower	→	05 - 10
	Lower	→	00 - 04

SOCIAL SECURITY MEASURES for INDUSTRIAL WORKERS in INDIA

→ The Workmen's compensatⁿ Act 1923
The factory Act 1948
The ESI Act 1948
The coal miners provident fund & Bonus act 1948
The Employee's PF Act 1952
The central maternity benefit Act 1961
The family pensⁿ scheme 1971
The Oldage pensⁿ scheme

WATER

SAFE & WHOLESOME WATER

→ free from color/odour
free from chemicals
free from Biological agents
usable for domestic purposes

DISINFECTN OF WATER

Boiling [Best]
Chlorine [2nd Best]; No effect on → cyclop, Polio virus, Hepatitis A, Helminth cysts, Helminth ova, Bacterial Spores
UV rays
Ozone Gas

→ chlorine → only method having RESIDUAL ACTION

CHLORINATION

→ Cl_2 acts best if pH 7
→ % available Cl_2 in Bleaching powder → 33%
→ gms of bleaching powder is sufficient to disinfect 1000L of water → 2.5gms
→ MOA

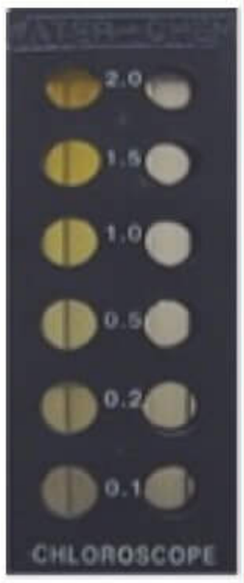
CHLORINE + IMPURITIES
↓
DESTRUCTION ⟶ Add some additional Cl_2 [FREE/RESIDUAL Cl_2]

→ Main disinfecting actn of chlorine in water is due to HYPOCHLOROUS ACID [HOCl] [90% of disinfectn] + Hypochlorite ions [10% of disinfectn]

FREE/RESIDUAL CHLORINE LEVELS RECOMMENDED

1. in drinking water → ≥ 0.5 mg/L → ε contact period of 1 hr
2. in drinking water to Kill cyclops → ≥ 2.0 mg/L ε contact period of 1 hr
3. Swimming pools of Sndia → ≥ 1.0 mg/L [ppm] ε contact period of 1 hr

→ Free chlorine level can be estimated by → CHLOROSCOPE
→ Tests
- OT [ortho Toulidine] Test



OT TEST

→ can get levels of

01. FREE CHLORINE
02. TOTAL CHLORINE [Directly]
03. combined chlorine [Indirectly]

OTA [Ortho Tolluidine Arsenite] Test

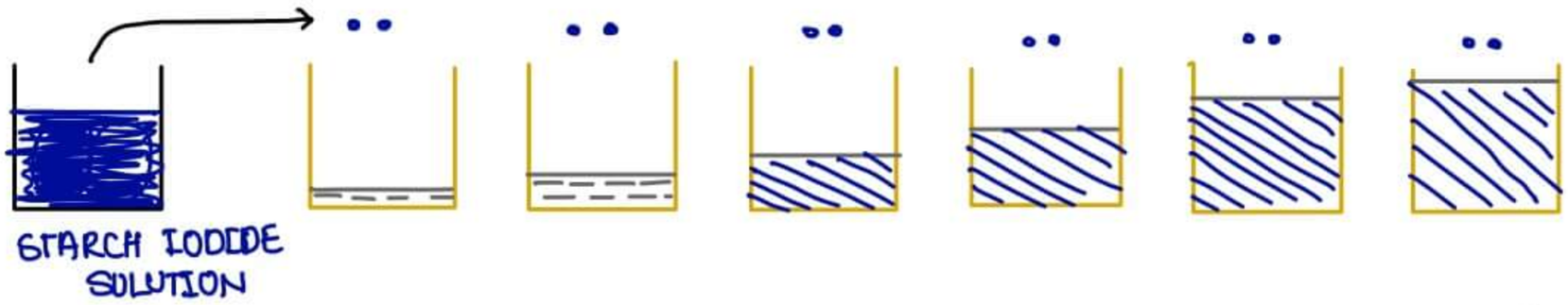
→

01. FREE CHLORINE
02. COMBINED CHLORINE [Directly]
03. Total chlorine [indirectly]

→ OTA is better than OT test
- gives free & combined levels seperately
- not affected by inorganic impurities in water

CHLORINE DEMAND

→ estimated by HORROCK's Apparatus
→ 6 white cups & 1 black cup
→ Indicator → Starch Iodide



→ (n×2) gms of Bleaching powder will disinfect 455L water [n - no. of first cup to show color change]

Q. Grams of bleaching powder required to disinfect 2250 L water, where 3rd cup is the first cup to show color change in Horrock's apparatus

→ n = 3

[3×2] gm required for 455 L water

2250L requires = $\frac{2250}{455} \times 6$ = 30 gms of B. powder

HARDNESS OF WATER

→ Soap destroying power of water → Hardness

TEMPORARY	PERMANENT
→ dlt Ca^{2+} / Mg^{2+} Salts of Bicarbonates	→ dlt Ca^{2+}/Mg^{2+} Salts of Sulphates, chlorides, Nitrates

→ softening of drinking water is done if hardness is > 150 mg/L [> 3 m Eq/L]

	Temporary Hardness	Permanent Hardness
Removal of Hardness of water	→ Boiling → LIME → $NaCO_3$ → PERMUTIT	→ $NaCO_3$ → Base exchange

PUBLIC HEALTH CLASSIFICATION OF WATER BORNE DISEASES

I WATER BORNE DISEASES

- feco-oral
- • Typhoid • salmonella
  • cholera • E. coli
  • Hepatitis A

II WATER WASHED DISEASES

- inadequate use of water
- scabies

III WATER BASED DISEASES

- some organism based in water
- Guinea worm Disease

IV WATER BREEDING DISEASES [insect related]

- insect related
- Malaria, Dengue

BACTERIOLOGICAL INDICATORS OF WATER QUALITY IN INDIA

01. coliforms [E. coli] → Best overall

02. fecal Streptococci → indicates recent contaminat^{n} of drinking water

03 Clostridium perfirenges → indicates remote contaminat^{n} of drinking water

Screening Tests OF Coliforms in Drinking water

→ Presumptive coliform Test
[MPN multiple Tube method]
- Uses Mc CRADY TABLES

MPN - most propable number

Diagnostic Tests → EIJKMANN TEST

GUIDELINE ASPECTS OF DRINKING WATER QUALITY IN INDIA

→ colour → < 15 TCU [<5 HAZEN]
→ Turbidity → < 1 NTU
→ Hardness → < 100 - 300 mg/L
→ PH → 6.5 - 8.5
→ TDS → < 500 mg/L
→ Fluorides → < 1 ppm
→ Nitrates → < 45 mg/d
Nitrites → < 3 mg/d
→ Radio Activity ⟶ α → < 0.5 Bcq/L
⟶ β → < 1.0 Bcq/L

AIR

		used to assess
→	Kata Thermometer	→ Low Air velocity
	Hygrometer	→ Air Humidity
	Psychrometer	→ Air Humidity
	Anemometer	→ Air velocity
	Wind Vane	→ Air Direct^{n}

HOUSING STANDARDS & VENTILAT^{n} STANDARDS

→ Per capita Air Requirement → 300 - 3000 cu. ft/Hour [~ 1000 - 1200 CU FT]

→ Recommended no. of air changes/hr in
- Living Room → 2-3
- clinic → 4-6

Types of ventilat^{n}

1. Exhaust ventilation → Pushes older air out of the room
2. Plenum ventilation → Pushes fresh air in the room

Balanced ventilation → Exhaust + Plenum Ventilation

Air conditionig

AIR POLLUTION

Indicators
- CO_2 CO
- SO_2 NO_2
- Air pollut^{n} Index
- Soiling index
- Coefficient of Haze
- SPM [suspended Particulate matter]

Overall best Air pollution indicator } SO_2
Overall best chemical Indicator of AP }

best biological Indicator of Air pollut^{n} → LICHENS

Air Pollut^{n} monitoring → CPCD [central Pollut^{n} Control Board]

Global warming / Green House effect

major contributor → 1. water vapour > 2. CO_2

P_4SR → Pridictable 4 hr sweat rate
- for comfort Level → 1-3 litres

max permissible / max P_4SR → < 4.5 ltr

KYOTO PROTOCOL

→ Signed by 187 Countries on 16 feb, 2005

→ Includes CO_2 N_2O CFC CH_4 SF_6 PFC

LIGHT

- → minimum illuminat^{n} level for satisfactory vision → 15-20 foot candles
- → Day Light Factor [DLF]
  - Living Room → ≥ 8%
  - Kitchen → ≥ 10%.

SOUND

- → Tolerable sound level to Human ear → <90dB
- → Auditory fatigue starts → >90dB
- → Permanent Hearing loss → >100dB
- → Direct tympanic membrane Rupture → 150-160dB
- → Hospital ward [permissible level] → 22-35 dB
- → Normal conversation → 60-70 dB

HOUSING

HOUSING STANDARDS

- → Floor space per person → >50-100 ft^2 [70-90 ft^2]
- → cubic space per person → > 500 ft^3
- → Doors & windows area → 40% of floor area

Overcrowding criteria

- → No. of persons / Room → > 2
- → Floor space / person → < 70-90 Ft^2
- → Sex seperat^{n} > 9 yrs age → Absent

RADIATION

- → Radiat^{n} exposure in Chernobyl tragedy → Cs, I_2, Sr
- → Thickness of Lead apron to prevent exposure → ≥ 0.5mm
- → State recieves highest Solar Radiat^{n} → Rajasthan
  State Utilizing max. Solar Radiat^{n} → Gujarat
- → Total natural radiat^{n} recieved by humans → 0.1 rad/p/yr
- → max permissible Radrat^{n} exposure
  - Man → 5 rad/p/yr
  - Pregnancy → 0.5 rad/p/yr [0.5 REm/5 mSV]

WASTE DISPOSAL

- Refuse → Solid waste from either living room, or Street or Industry
- Garbage → Solid waste from Kitchen
- Sewage → Liquid waste ī human excreta
  → Fecooral diseases transmits by Sewage
- Sullage → Liquid waste īout human excreta

SEWAGE

→ Contains 99.9% water

→ Strength assessed by

1 BOD [Biological O_2 Demand]

2 COD [Chemical O_2 Demand]

3 Suspended solids

→ Strong Sewage → BOD > 300

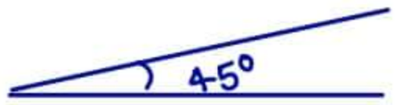
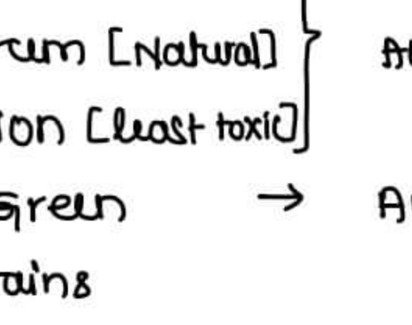
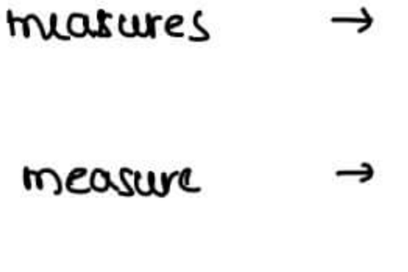
MEDICAL ENTAMOLOGY

VECTORS		DISEASE [S]
Sand Fly [Phlebotamus]	→	Kala Azar, Oriental Sore, Changuinola V, Sicilran V, Oraya fever, Sandfly fever, Chandipura V, Naples V etc
Tsetse Fly [Glossina]	→	Sleeping Sickness of Africa, IOC → DDT
Redwid Bug [Triatominae]	→	Sleeping Sickness of America
Kissing Bug / Assasign Bug		
Rat Flea [Xenopsylla]	→	Plague, Endemic typhus, Chiggerosis
Soft Tick	→	Q fever [Animals], only Rickettesial Dz out vector – Q fever Relapsing fever, KFD [outside India]
Hard Tick	→	KFD [In India], Tick paralysis, Tick encephalitis Babesiosis, Congo fever, Tularemia, Tick Haemorrhagic fever
Louse	→	Epidemic Typhus, Trench fever Relapsing fever, Pediculosis
Black Fly [Simulum]	→	Onchocerciasis

Flight range ~ 100 miles

Anopheles	Culex	Aedes	Mansonia
Malaria	L. Filariasis JE west nile fever	Dengue Chickengunya Yellow fever Zika virus Rift valley fever	Brugian filariasis

				breeding habitant
Anopheles	→	Sophisticated Mosquito	→	Clean water
Culex	→	Nuisance Mosquito	→	Dirty water
Aedes	→	Tiger Mosquito	→	Artificial collectn of Rain water
Mansonia	→		→	Aquatic plants

	ANOPHELES	CULEX	AEDES	MANSONIA
Eggs	Boat shaped Lateral Floats	Small Clusters	Single Cigar Shape	Star shaped Clusters
Larval	Rest parallel to water surface [NO siphon tube]	Rest at an angle to water surface [Siphon tube Present]		Attached to roots of Aquatic plants
Adult	 Sit at 45° Stright body Spotted wings 	 Hunchback Posture	 Hunchback posture	
Flight Range	3-5 Km	11 Km	100m	
				

→ Life span of Mosquito → 8-34 Days

MOSQUITO CONTROL MEASURES

Physical →
- Source Reduct^{n} → overall best method → Primordial Method
- Mosquito Nets → Size of mesh → 0.0475 inch
  - No. of Holes/ sq. inch → > 150

Chemical →
- DDT
- Pyrethrum [Natural]
- Malathion [least toxic]

} Anti Adult measures → Nerve/contact poison
- Achase inhibitors

- Paris Green → Anti larval measure → Stomach poison
  - contains Cu Aceto Arsenite

Biological →
- Gambusia → Affinity for Anopheles Larval
- Lebister
- Poecilia

} Larcivicidal fishes

→ H14 → Bacillus thuringiensis
→ Coelomyces → Fungus
→ Toxorhynchitis → Mosquito

INTERNATIONAL HEALTH

2018 WHD THEME — UNIVERSAL HEALTH COVERAGE: EVERYONE, EVERYWHERE

INTERNATIONAL HEALTH AGENCIES

WHO [WORLD HEALTH ORGANISATION]

→ Established 1945
Constitut^{n} came into force on 7th APRIL 1948 → 7th APRIL - WORLD HEALTHDAY
→ Headquarters located in GENEVA [switzerland]
→ WHD 2018, 2019 THEME → UNIVERSAL HEALTH COVERAGE
→ Composit^{n} of WHO

WHO →
- World Health Assembly
- Executive Board
- Secretariat

WHO LOGO

UNICEF [United Nations International Children Emergency fund / UN Children fund]

→ Headquarters in → New York
→ GOBI - FFF Compaign

G	Growth monitoring	f	family Planning
O	ORS	f	female Education
B	Breast feeding	f	food supplementat^{n}
I	Immunizat^{n}		

UNICEF LOGO

ILO [International labour organisation] → HQ → Geneva

FAO [food & Agricultural organisation] → HQ → Rome, Italy
→ FFHC [freedom from Hunger compaign]

IRC [International Red cross] → HQ → Geneva → Henry Dunal

DISEASES COVERED UNDER IHRs [International Health Regulations] WHO

1. IMMEDIATELY NOTIFIABLE DISEASES [< 24 hrs]
   - → Small pox
   - → Wild polio
   - → Human Influenza
   - → SARS
2. POTENTIALLY NOTIFIABLE DISEASES
   2a. PUBLIC HEALTH IMPORTANCE
   - → cholera
   - → Plague
   - → Yellow fever
   - → viral Hemorrhagic fevers [Ebola, Marburg, Lassa]
   - → West Nile fever
   - → Dengue
   - → Rift valley fever
   - → Meningococcal Disease

   2b. BIOLOGICAL / CHEMICAL / RADIOLOGICAL EVENTS
   2c. SERIOUS ILLNESS OF UNKNOWN ORIGIN

DISEASES UNDER TRAINING & RESEARCH

1. Malaria
2. Filariasis
3. Leprosy
4. Leishmaniasis
5. Trypanosomiasis
6. Schistosomiasis
7. Onchocerciasis
8. TB
9. VBD [Dengue, CGF, Zika]
10. Ebola
11. Helminthiasis

LIST OF QUARANTINABLE DISEASES

1. Diphtheria
2. Infectious Tuberculosis
3. Plague
4. Small Pox
5. Yellow fever
6. SARS
7. Viral Haemorrhagic fevers
8. Cholera
9. Flu

BIOTERRORISM AGENTS

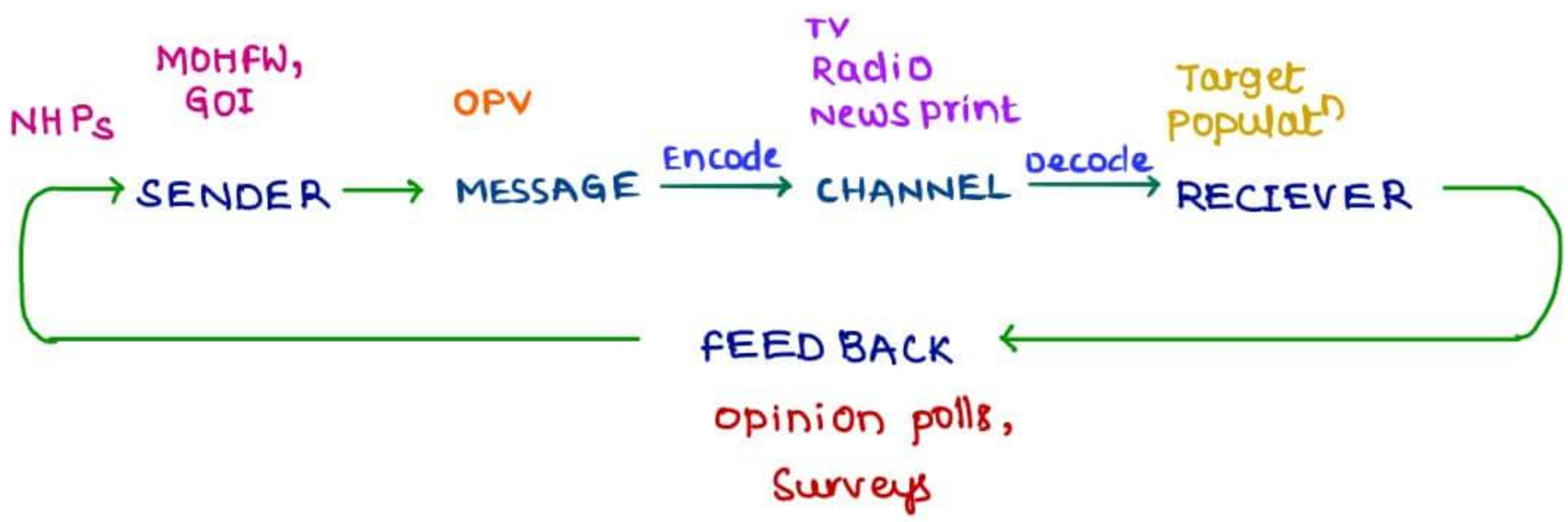
CATEGORY A	CATEGORY B	CATEGORY C
→ most Dangerous → most easy to spread → 1. Anthrax [mc used] 2. Small Pox [most dangerous] 3. Plague 4 Botulism [most lethal Toxin] 5. Tularemia 6. Viral Haem. fevers	→ Less dangerous → less easy to spread → 1. Brucellosis 2. melidiosis 3. Psittacosis 4. GLANDERS 5. STAPH Toxin 6. RICIN Toxin 7. Q fever 8. Epidemic Typhus 9. Food safety Threats 10. Water safety Threats 11. Clostridium perfringes	→ New → Emerging → 1. HANTA virus 2 NIPAH Virus

Acc to IHR's, Air travel in pregnancy is permitted upto 36 wks POG in Singleton pregnancy
Air travel in pregnancy is permitted upto 32 wks POG in TWIN pregnancy
After 28 WKs, should carry EDD certificate [Expected Date OF Delivery certificate]

HEALTH COMMUNICATION PROCESS

→ Exchange of Ideas, feeling & informatⁿ in the field of health

→ COMPONENTS



Approaches for Health communicatⁿ

Individual Based	Group Based	Mass Approach Based
Home visits	Lecture	TV
Personal contact	Demostratⁿ	Radio
	FGD [focus Gr. Discussion]	News Prints
	PD [Pannel Discussion]	Posters
	Symposium	Exhibitⁿ
	Work shop	Internet
	Conference	
	Seminar	
	Role play	

HEALTH COMMUNICATION METHODS

01. LECTURE [CHALK & TALK METHOD]

→ 1 person addressing audience

→ Group size [recommended] < 30

Duratⁿ [recommended] < 15-20 minutes

Lecture

→ Advantage → can cover larger audience in lesser frame of time

→ can communicate more things

→ Disadvantage → learning is passive

No Q & A [Qushoning & Answering]

02. FGD [Focus Group Discussion]

→ very effective method

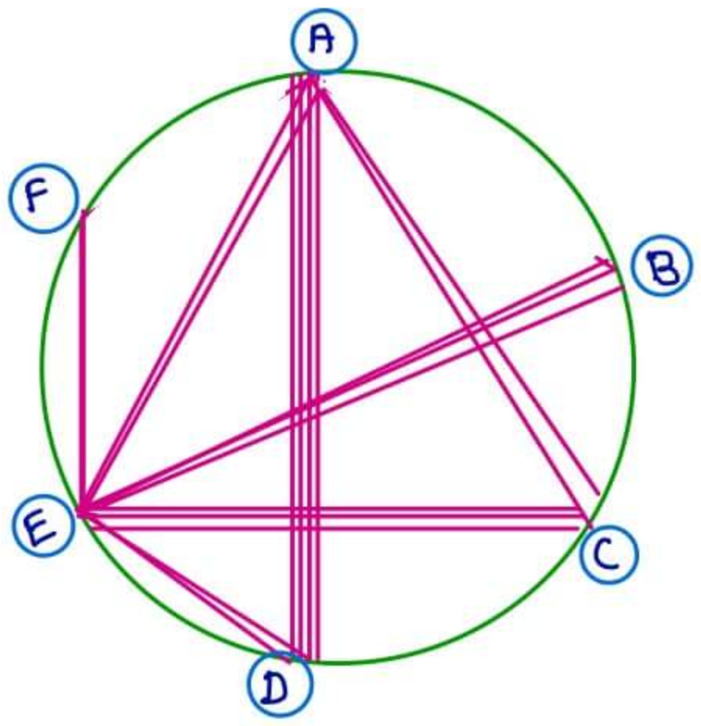
→ Discussion on health among 6-12 persons

1 is Group leader

1 is Recorder

- manual / Electronic
- has to draw diagram

Focus Group Discussion

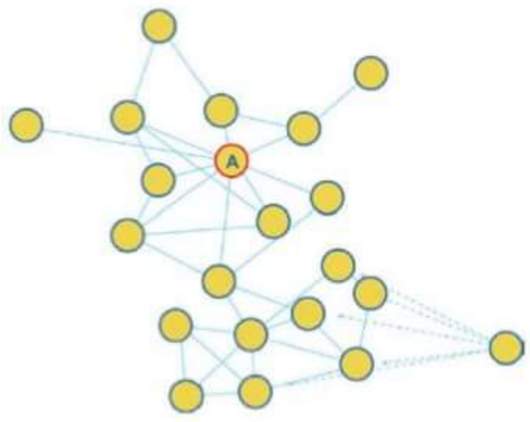


SOCIOGRAM

→ Interactⁿ b/w particpatⁿ in FGD

→ Advantages

- can make discussion more healthy by promoting/ restricting persons to particpate in discussion



SOCIOGRAM

03. PANEL DISCUSSION [PD]

→ Discussion among 4-8 experts infront of audience

→ NO specific order of speeches

→ NO set speeches

→ News channel discussion → Type of Panel discussion

Panel Discussion

04. Workshop

→ series of 4-5 meetings to impart training or skills to participants

→ Group work , Group Discussion , Plan of Action

→ Help from consultants & Resource persons taken

05. Symposium

→ 'series of lectures' by 'experts' in front of 'audience'

→ NO discussion at all among experts

→ Specific order of speeches tnt.

→ Set speeches tnt.

06. Role Play / Socio Drama → Street Play

→ 'situatⁿ dramatised' by a group of people infront of audience

→ followed by discussion

→ Ideal audience size → < 25

07. Conference/ Seminar

→ combinatⁿ of methods at 'Big/ Macro level' [University, State, National level]

08. IPC [Inter Personal Communicatⁿ / face-to-face / one-to-one Communicatⁿ]

→ Most effective method even better than FGD

09. Demonstratⁿ

→ Principles → Seeing is believing
→ Learning by doing

→ Eg – ORS preparatⁿ

10. FLANNELGRAPH

→ series of photographs pasted on a piece of cloth in correct chronological sequence

→ Life cycle of plasmodium [eg]

11. pSPIKE's Technique

→ Communicatⁿ of cancer Dx & Prognosis

→ p → Protocol of 6 steps

S	Set up interview
P	Perceptions
I	Invitatⁿ to explain
K	Knowledge
E	Emotions
S	Summary & Starlegy

→ Best used for Breast cancer

12. Gather Approach

→ used for Contraceptive Counselling in RCH

G	Greet
A	Ask → permanent / temporary
T	Tell
H	Help
E	Explain
R	Return visit

→ older name → Cafeteria Approach

DIDACTIC One Way Communicatⁿ	SOCRATIC Two way Communicatⁿ
Lecture	FGD
Flannel Graph	PD
TV	Symposium
Radio	Roleplay
News Print	Workshop
Posters	IPC
Charts	Seminar / Conference
Banners	Demonstratⁿ
Pamplet	SPIKES
	GATHER

DOCTOR - PATIENT Communication

Levels ③

1. Intellectual → based on literacy & comprehension OF doctor & patient
2. Emotional → Bonding b/w Doctor & patient
3. Cultural → Doctor & patient from same region | Religion / Socioeconomic Status

TYPES ④

1. Default → Neither doctor, nor patient has focus
2. Paternilistic → Doctor is dominant
3. consumeristic → Patient is in focus [seen in Pvt. Hospitals]
4. Mutualistic → Both doctor & patient jointly involved in decision making

HEALTH EDUCATION

HEALTH EDUCATION

→ processes by which individuals & groups learn to behave in a manner which is CONDUCIVE to promotⁿ, maintainance & restoratⁿ of Health [JOHN M. LAST]

Approaches

1. Regulatory Approach / Managed Prevention
   - Coercive / Legislative Approach
   - Successful to a limited extent

2. Service Approach
   - providing health services at door step
   - limited success
   - Not based on feltneeds

3. Health Educat^{n} Approach
   → slow process but enduring results

4. Primary Health care Approach
   → community involvement
   → Intersectoral co-ordinat^{n}
   → Radically New Approach

Principles
→ credibility
→ Interest
→ Particpat^{n}
→ motivat^{n}
→ Comprehension
→ Reinforcement
→ Learning by doing
→ Known to unknown
→ setting an example
→ Good Human Relations
→ feedback
→ Local leaders involvement

HEALTH EDUCATION	HEALTH PROPAGANDA
→ appeals to REASON	→ appeals to EMOTIONS
→ Thought process ⊕nt	→ No thought process
→ Knowledge & skill actively aquired	→ Knowledge & skills instilled in minds
→ Behavior REFLECTIVE	→ Behavior REFLEXIVE
→ Processes – Behavior centred	→ processes → Informat^{n} centred

MASS MEDIA
→ Diversified collect^{n} of media technologies intended to reach a mass audience
→ Advantages → reached to large populat^{n} in small time
even in Lower literacy rate → effective
Reach remote areas
Gets attent^{n}

→ Dis Advantages → Mostly one way c
may not effect change of behavior

→ TV, Radio, News Print, Internet
Museums, Exhibits,
folk media

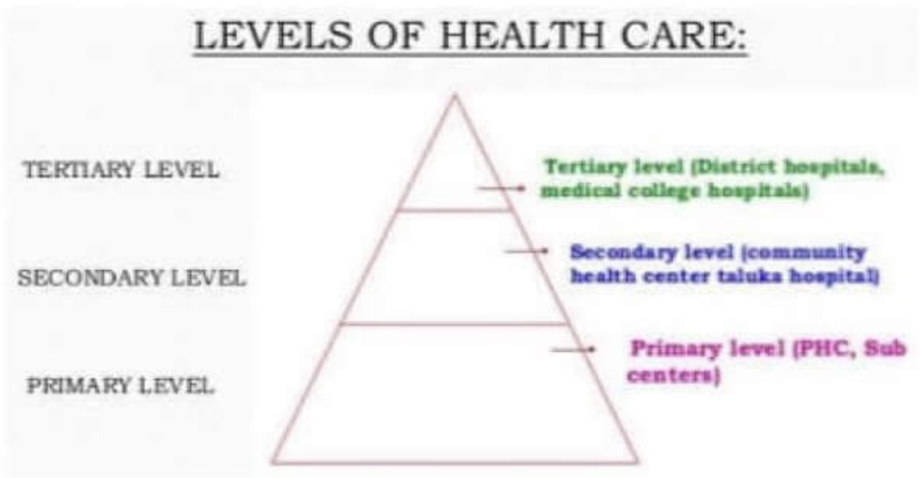
→ TV – most popular / effective
fastest growing → internet

PRIMARY HEALTH CARE

→ According to ALMA ATA 1978

Essential health care characterized by

A → Acceptability
A → Accessibility
A → Availability
A → Affordability



ELEMENTS OF PH CARE

E → Essential Drugs
- most essential drug → Paracetamol
- 33 – 38 Essential Drugs included in PHC

L → Locally Endemic Disease Prevent^{n} & control
E → Educat^{n} [Health]
M → Maternal & child Health [includes FP]
E → EPI 1978 → UIP 1985 [universal Immunizat^{n} Programme]
N → Nutrit^{n}
T → Treatment of common ailments
S → Safe water supply & sanitat^{n}

4 PILLARS / PRINCIPLES OF PH CARE

1. Equitable Distribut^{n}
   - social
   - Demographic
   - Economic

2. Appropriate Technology
   - ORS
   - stand pipes
   - Excl. Breast feeding, KMC [Kangaroo Mother care]
   - ↑RR [Resp. Rate]

3. community Participat^{n}
   - ASHA
   - Bare foot doctors

4. Intersectoral co-ordinat^{n}

RURAL & URBAN HEALTH CENTRES, WORKERS, NORMS

LEVELS OF PH CARE

→ Tertiary → Second Referral Level / Unit [SRU]

→ Secondary → First Referral level / Unit [FRU]

→ primary → First contact level b/w populat^{n} & health system of country

HEALTH CENTRES

	Populat^{n} Norms plains	Hilly/Tribal/DTA	BEDS	INFRASTRUCTURE NUMBERS	STAFF
Tertiary					
MED. colleges & hospitals	—	—	—	500 +	—
Secondary					
CHC	1/ 120000	1/ 80,000	30	5,500 +	46-52
Primary					
PHC	1/30,000	1/20,000	4-6	25,000 +	13-21
Sub centres ↓ Central Govt Assisted	1/5,000	1/3,000	ZERO	1,55,000 +	3-4

SUB CENTRES	TYPE A	TYPE B	
Delivery	×	✓	MPW = HW
HW [m]	1	1	
HW[F]/ANM	1	2	
Safai Karamchari	1	1	
	3	4	

PHC	TYPE A	TYPE B	
No. OF deliveries/month	<20	>20	Health assistant ⊕nt at PHC
MBBS	1	2	
AYUSH	1	1	
	13-18	14-21	

CHC

→ MD/MS Medical Officers

④	③	② → ⑨
Medicine	Ophthalmologist	Dental surgeon
Surgery	Anesthetist	AYUSH Medical officer
Gyn & Obs	Public health specialist	
Pediatrician		

→ Total → 46-52

→ Health superviser + nt

Gross Root Level Workers

→ ASHA → Accredited Social Health Activist
MPW → Multi Purpose worker
VHG → Village Health Gurde [Community Health worker]
TBA → Traditional Birth Attendant [Trained Dai]
AWW → Anganwadi worker

	LOCATION	POPULATION NORM	EDUCATION	TRAINING
ASHA	village	2/1000	10th	23 Days
MPW	sub centre	1/5000	12th	12 months
VHG	village	1/1000	6th	3 months
TBA	village	1/1000	—	1 month
AWW	AWC	1/400-800	10th	4 month

ASHA WORKER [Accredited Social Health Activist]

NRHM 2005-12, NHM 2013 -
25-45 years old female worker
Resident of same village

→ Bridge between → village & ANM
→ Selected by → village Panchayat
→ Accountable to → village Panchayat
→ Training by → ANM & AWW
→ Impact indicators → 1. Reduction of IMR [main]
2. TB cases detected
3. Leprosy cases detected
4. PEm rates

URBAN H.CARE SYSTEM → NUHM 2013

Tertiary
Med colleges & Hospitals —

Secondary
UHC → Non-metros 1/2,50,000
Metros 1/5,00,000

Primary
Urban - PHC [UHC] 1/50,000
No sub centre

USHA [Urban Social Health Activist] → 1/1000-2500
U-ANM → 1/10,000

POPULATION NORMS

	Plain	Hilly
1 Sub centre	1/5,000	1/3,000
1 PHC	1/30,000	1/20,000
1 CHC	1/1,20,000	1/80,000
1 AWC	1/400-800	1/300-800
1 UHC [U-PHC]	1/60,000	
1 U-CHC → Non-metros	1/2,50,000	
→ Metros	1/5,00,000	

1 ASHA	2/1,000
1 MPW	1/5,000
1 VHG	1/1,000
1 TBA	1/1,000
1 AWW	
Plains	1/400-800
Hilly	1/300-800

DOCTOR-POPULATN RATIO

1 USHA	1/1000-2500
1 U-ANM	1/ 10,000
1 Pharmacist	1/ 10,000
1 LAB Technician	1/ 10,000
1 Health Assistant	1/ 30,000, 1/20,000
1 Health Superviser	1/ 120,000, 1/80,000

1 TB MICROSCOPY	/ 100,000
1 TB UNIT	/ 500,000
1 STLS [Sr. TB lab supervisor]	/ 500,000
1 malaria microscopy	/ 25000
1 SET Centre [Survey Educatn, R,]	/ 25000
1 ULC [Urban leprosy Centre]	/ 50 000
1 LCU [Leprosy Control Unit]	/ 450,000

1 Doctor / 1000 populatn
3 Nurses / 1 Doctor
1 Ophthalmologist / 50,000 populatn
/ 5 CHC's

AYUSH, SOCIALISED MEDICINE

ALTERNATIVE FORMS OF MEDICINE

→ Earlier Name → ISM & H [Indigenous System of Medicine & Homeopathy]
→ Newer Name → AYUSH

Ayurveda } Indian Origin
Yoga & Naturopathy }
Unani → Greek origin
Siddha → Indian origin
Homeopathy → Germany
Father → Samuel Hahneman

⊕

SOWA - RIGPA
Chinese, Taiwan System of faith Healing

→ STATE MEDICINE
- free medical care by govt. of a country

→ SOCIALIZED MEDICINE
- free medical care by Govt but regulated by professional groups/bodies
- started in RUSSIA 1978
- Advantages of socialized Medicine
  1. Prevent competitn among Private Practitioners
  2. Provision of Medical services by State Govt.
  3. Social Equity

COUPLE PROTECTION RATE [CPR]

$$CPR = \frac{\text{Total no. of protected couples}}{\text{Total no. of eligible couples}} \times 100$$

→ CPR India → 54%

→ CPR is a proportion

Effective CPR [ECPR]

$$ECPR = \frac{\text{Total Effectively protected couples}}{\text{Total no. of eligible couples}} \times 100$$

Q) Total populatn = 1000
Total Ec's = 180

FP DATA 2001

			Effectivity		
condoms	=	29	50%	→	14.5
OCPs	=	10	100%	→	10
IUDs	=	10	95%	→	09.5
vasectomy	=	03	100%	→	3
Tubectomy	=	08	100%	→	8
					45

CPR → ?

Q) ECPR → ?

→ $\frac{60}{180} \times 100 = 33.3\%$

→ $\frac{45}{180} \times 100 = 25\%$

CONTRACEPTIVE FAILURE / CONTRACEPTIVE EFFICACY

I Pearl Index

$$PI = \frac{\text{Total no. of Accidental Gestations}}{\text{Total months of exposure}} \times 1200$$

→ Expressed per Hundred women years [HWY]

Q) 100 women use 'C' for 2 yrs each.
10 pregnancies occur. PI → ?

→ $\frac{10}{24 \times 100} \times 1200 = 5$ per HWY

II. Life Table Analysis

→ Expressed as per single woman months of use

→ Better Index

Pearl Index

Male condoms	→	2-14 / HWY	14
Female condoms	→	5-21 / HWY	21
IUDs	→	1-5 / HWY	2
OCPs	→	0.1-2 / HWY	1
Sterilizatn	→	~ 0.1 / HWY	
vaginal sponge	→	9-20 / HWY	

→ more effective is vasectomy than tubectomy

CONVENTIONAL CONTRACEPTIVES

→ used exactly at the time of intercourse

→ Male condoms

Spermicides

- Chemical → Non Oxynol 9
- MOA → by rupture of plasma membrane of Acrosomal cap

INTRACEPTIVE / Emergency / Post Coital contraceptives

→ used after intercourse

→ Combined OCPs	→	Tin 72 hrs	
POPs	→	Tin 72 hrs	→ Recommended in RCH
IUD	→	Tin 05 days	→ most effective [C/I in nulliparous]
RU-486 [Mifepristone]	→	Tin 72 days	
High dose Estrogen	→	x 5 days	

Combined OCPs

→ Yuzpee & Lancee Method

4 pills + 4 pills

⟷ 12h gap

< 72hrs

POPs

→ 1 pill + 1 pill

⟷ 12h gap

< 72 hrs

→ progesteron of single pill → 0.75 mg

NATURAL METHODS, BARRIER METHODS, IUDs & OCPs

Natural Methods

→ PI - 60 / HWY

1. Calender Method / fertile period method / safe period method / Rhythm method
2. BBT method
3. Cervical Mucus method
4. Symptothermic method
5. Abstinence → PI = 0 [most effective]
6. coitus Interruptus

Barrier Methods

→ MOA → Barrier b/w sperm & ova

Male condom

	MALE CONDOMES [NIRODH]	Female condomes
PI	→ 2-14 / HWY	→ 5-21 / HWY
HIV protectn	→ +	→ ++
Reusability	→ ×	→ ✓
Material	→ Latex	→ Polyurethane / Nitrile
Length	→ Shorter	→ Longer
No. of Rings	→ 01	→ 02

Female condom

Diaphragm [Dutch cap]

→ used ī spermicide
→ reusable
→ 4hrs ⟵ Intercourse ⟶ 6hr
→ should be educated ♀ [Temporary Spacing]
→ complicatn → Toxic shock syndrome

Diaphragm

Vaginal sponge [Today]

→ used ī spermicide [Non-Oxynyl 9]
→ 4hr ⟵ Intercouse ⟶ 4hr
→ complicatn → Toxic shock syndrome
→ PI → 9-20 | HWY

Chemical methods

→ foams, Jellies, Spermicides

IUD

Ist Generatn	2nd Gen	3rd Gen
Non medicated / Inert	Medicated / Bio active	IUD's
Lippe's Loop	Copper	Hormones
Grafenberg's Ring	CUT 7	Progestasert
	CUT 220B	LNG - IUD
	CUT 380A	

CUT 380 A → mc used IUD in india
→ 380 → Surface area of Cu in mm^2
→ A → Arm ⟶ Ag → CUT 380 Ag
Au → CUT 380 Au

- ↑ shelf life [5yr → 10yrs] upto 12yrs

PROGESTASERT
→ Rate of progesteron release → 65 µg / Day
→ Total progesteron content → 38 mg → shelf life → 1-1½ yrs

→ mc side effect → Bleeding

Management at PHC — ~~Remove~~

$FeSO_4$ 200mg TDS x 6 WKS —No use→ Remove IUD

→ 2nd mc SIE → Pain

Management

- mild analgesics & wait & watch
- Removal OF IUD

→ Pregnancy ε IUD in situ

management

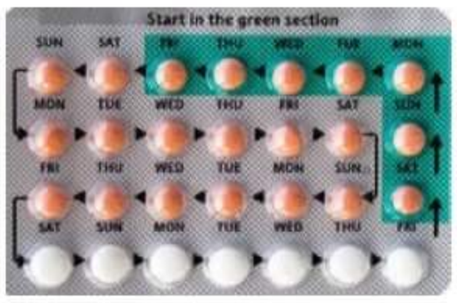
- Gently remove IUD
- DO medical terminat^{h} of pregnancy

1. Combined OCP's

→ Estrogen + Progesteron

→ MALA N } EE [Ethinyl Estradiol] → 30 µcg → Free

MALA D } Levonorgestrol → 150 µcg → Rs 3/-



} E+P

→ 60 mg ferrous fumerate

- maintains continuity
- prevents anemia

Withdrawal Bleeding

Absolute c/I

C Cancer [Breast, Cervical]

L Liver Disease [Adenoma]

U Uterine Bleeding [Excessive & undiagnosed]

T Thromboembolism

C Cardiovascular Disease

H Hyperlipidemia [congenital]

Pregnancy

2. Centchroman / Saheli / CHHAYA [reintroduced]

→ Non steroidal / Hormonal OCP

→ contains ORMILOXEPHENE [SERM]

→ frequency → Once a week pill

Twice / week first 3 months

→ Central Drug Research Institute, Luknow produced it

→ PI → 1.84 - 2.84 / HWY

→ CI in PCOD

3. Progesteron Only Pils [POPs] / Lactatn / Mini / Micropils / INTRACEPTIVE PILLS

4. Quinesterol
   - → once a month pil
   - → No longer used

5. Gossypol
   - → Male pil
   - → made from chinese cotton Oil
   - → in 10% causes permanent Azoospermia

Depot formulations

- → Intramuscular Injectable Hormones
- → DMPA → Depot medroxy Progesteron Acetate
  - 150 mg im / every 3 months
  - Brand name → ANTARA

NET - EN → Nor Ethisterone Enanthate
- 200 mg im every 2 months

NORPLANT

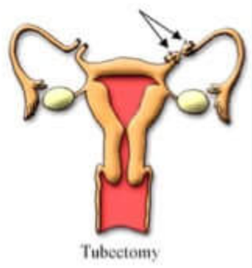
- → Subdermal Implant
- → 6 Silastic Capsule , 35 mg LNG each
- → Sx procedure for implantatn & removal
- → Shelf Life → 5 yrs

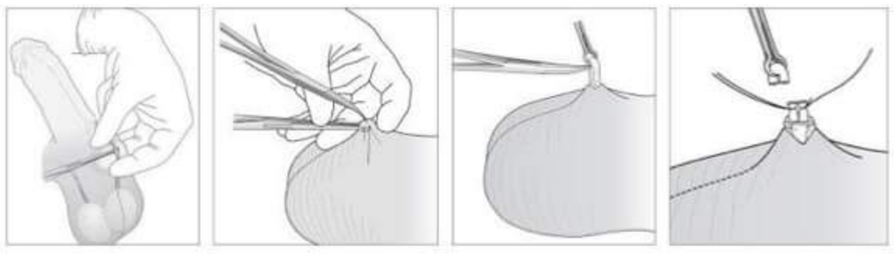
STERILIZATION [NEW GUIDELINES 2014]

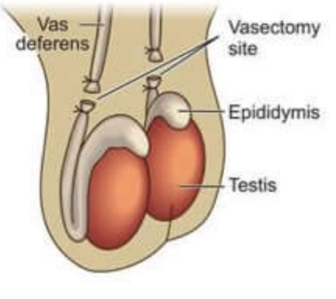
FEMALE STERILIZATION	MALE STERILIZATION
→ married	→ married
→ 22 - 49 yrs old female	→ 22 - 60 years old male
→ >/ 1 child [> 1 yr age]	→ >/ Child [> 1 yr age]
→ no past history in self / Spouse	→ no past history in self / Spouse
→ MINILAP - Trained MBBS / MD Gynobs / DGO	→ CONVENTIONAL VASECTOMY - Trained MBBS & above
→ LAPAROSCOPIC STERILIZATION - MD Gynobs / DGO MS Surgery	→ NO SCALPEL VASECTOMY [NSV] - Trained MBBS & above

Vasectomy

- → Anatomical structure cut → VAS
- → minimum length of VAS cut → ⩾ 1cm
- → most useful advise post vasectomy → Barrier methods × 3 m
- → mc failure of vasectomy → Surgical mis identificatn of VAS
- → NSV [NO scalpel vasectomy]
  - NO stich vasectomy
  - Small incision
    VAS pulled out
    cut, tie ends & push back
    Small bandage
  - Day care procedure


Tubectomy


NO scalpel vasectomy



NEW INITIATIVES IN FAMILY PLANNING

1. HOME DELIVERY OF CONTRACEPTIVES

- → Key health functionary → ASHA
- → Delivery charges
  - ↳ 3 condom pack → RS 1
  - ↳ OCP cycle → RS 1
  - ↳ EC Pill → RS 2

2. MISSION PARIVAR VIKAS [MPV]

- → Accelerate use of FP methods in 1146 high TFR districts

3. ENSURING SPACING AT BIRTH

- → Key health functionary → ASHA
- → counselling charges
  - ↳ First childbirth delayed by 2 yrs → RS 500
  - ↳ 3 yr spacing → RS 500
  - ↳ Opt for sterilization → RS 1000

- → CUT 375 : 5 year effectivity
- → Post partum IUD Insertion
- → Promotion of FP services at district hospital

4. NEWER CONTRACEPTIVES

- → CHHAYA : centchroman [saheli]
- → ANTARA : DMPA

5. FIXED DAY STATIC SERVICES APPROACH [sterilization]

- → DH → 2 | week
- → Sub DH [SDH] → Weekly
- → CHC | Block PHC → Fortnightly
- → PHC | 24 x 7 PHC → Monthly

6. PREGNANCY TESTING KITS

- → NISCHAY
- → Available at ASHA, Sub centres

COMMUNICABLE & NON COMMUNICABLE DISEASES

GENERAL EPIDEMIOLOGY

Period of Communicability

C. POX	→	2D$_{1d}$	←	RASH	→ 4d	5D
Measles	→	4D	←	RASH	→	5D
Rubella	→	4D before	symptoms	↔	7 days	post rash
Mumps	→	4D before	Symptoms	↔	7 days	post rash
Influenza	→	1-2D	←	Symptoms	→	1-2D
Diphtheria	→	14 - 28 D from onset				
Pertussis	→	7D post exposure		↔	3 wks	post paroxysmal stage
Meningococcus	→	until absent from the nasal/throat discharge				
Polio	→	7-10 D	←	Symptoms	→	7-10 D
Hepatitis A	→	2WKS	←	Jaundice	→	1 WK
Hepatitis B	→	Till disappearance of HBs Ag & appearance of Anti HBS Ag				
TB	→	As long as not treated				
HTV	→	LifeLong				
Tetanus	→	NONE				

Specimens for Diagnosis

TB	→	Sputum [smear]
Malaria	→	Blood [smear]
Leprosy	→	None
HIV	→	Blood
H_1N_1 Influenza Diphtheria	→	Nasopharyngeal secretions
chickenpox	→	vesicle fluid [microscopy]
Rabies		
Living person	→	Biopsy of skin follicles on nape of neck > corneal scrapings
Dead person	→	Brain Biopsy
Living Dog	→	Brain Biopsy
Dead Dog	→	Brain Biopsy

Vertical Transmission		MC Time
congenital varicella	→	1st Trimester
Rubella	→	1st Trimester
Syphilis	→	3rd Trimester
Toxoplasmosis	→	3rd Trimester
CMV	→	3rd Trimester
Hep B	→	3rd Trimester
Hep C	→	During Delivery
Herpes V	→	During Delivery
HIV	→	During Delivery
Parvo virus	→	2nd Trimester

Incubatn Periods

Measles	→	10 – 14 Days	[10 Days]
Rubella	→	14 – 21 Days	
Chicken pox	→	14 – 16 Days	
Influenza	→	18 – 72 hrs	[1-3 D]
H_1N_1	→	1 – 4 D	
Diphtheria	→	2-6 D	
M. Meningitis	→	3 – 4 D	
TB	→	Weeks – yrs	
Hepatitis A	→	15 – 45 D	[2-6 WKS]
B	→	45 – 180D	[6w - 6m]
C	→	30 – 120 D	
D	→	30 – 90D	
E	→	21 – 45 D	[3-6 WKS]
Polio	→	4 – 33 D	[~7 -14 D]
Cholera	→	1 -2 D	
Typhoid	→	10 – 14 D	
Staph. food poisoning	→	1 – 6 hrs	
Dengue	→	3 -10 D	
Malaria PV	→	8 – 17 D	14 D Median IP
Pf	→	9 -14 D	12 D MIP
PM	→	18 – 40 D	28 D MIP
PO	→	16 – 18 D	17 D MIP
L. filariasis	→	8 – 16 months	
Rabies	→	20 – 60 D	[3-8 WKS]
Yellow fever	→	2-6 D	
JE	→	5 – 15 D	
Plague	→	1 – 3 D	
Kala Azar	→	1 – 4 months	
Trachoma	→	5 – 12 D	
Tetanus	→	6 – 10 D	[8 D → 8th Day Disease]
HIV	→	months – years	[10 yrs]
CCF	→	1 – 3 D	
Ebola	→	2 – 21 D	
Nipah	→	14 – 16 D	
Anthrax	→	1 – 7 D	
Brucellosis	→	5 – 60 D	
ZIKA	→	3 – 10 D	
H_7N_9	→	1 – 10 D	

CASE → A person ĩ Disease, health disorder or condith

SUB CLINICAL CASE → Inapparent, covert, missed or abortive case; organism multiplies BUT DO NOT MANIFEST

CARRIER → Infected person or Animal that harbours organism in absenc of discernible clinical Disease

Secondary Attack Rate [SAR]

→ $SAR = \frac{\text{No. of secondary cases in 1 IP}}{\text{Total susceptibles}} \times 100$

→ proportn (%)

→ SAR Measles > 90%.
Mumps > 86%.
C. Pox > 90%.

→ measure of communicability / infectivity
→ Primary case is excluded from both numerator & denominator

→ IP Measles → 10 - 14 Days
Infectn vaccine ⟹ Life Long immunity

(Q) n = 100, all < 5yrs old. 33 developed measles in 2015 and 33 other got Measles vaccine in 2016. Now, 1 case of measles occur on 01/04/17, 11 more cases developed by 12/04/2017. SAR?

→ $SAR = \frac{\text{Total no. of sec. cases in 1 IP}}{\text{Total susceptibles}} \times 100$

$= \frac{11}{33} \times 100$

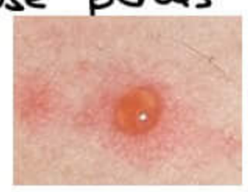
$= 33.3\%$

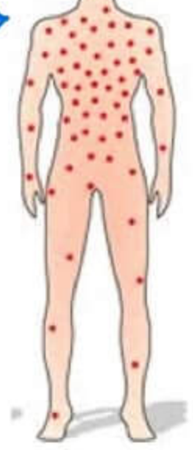
RESPIRATORY INFECTIONS

SMALL POX

→ causative Agent → variola major [varida minor → ALASTRIM]
Last case in India → 1975
Last case in World → 1977 [somalia]
Eradicatn → 8th May 1980

CHICKEN POX

Centripetal
Pleomorphic
Dew Drops on Rose petals

Superficial
Unilocular
affects flexor aspects, axilla
Rapid evolutn

RASH
C.POX →


S. POX

Centrifugal
Non-pleomorphic

Deep seated
multilocular
affects extensor aspects
Slow evolutn

→ cause → HHV-3 [α] "varicella"
IP → 14-16 D
Source → case
mode of Transmission → Respiratory [Air droplets]
Period of communicability → 2D ← Rash → 5D
SAR → 90%.
vaccine → Live attenuated
OKA Strain
Late complicatn → Shingles by Recrudescence

MEASLES

→ cause → RNA Paramyxovirus
→ IP → 10-14 D [10 Days]
→ Source → cases [No carriers - No iceberg phenomenon]
→ mode of Transmission → Respiratory [Air droplets]
→ Period of communicability → 4D ← RASH → 5D
→ SAR → > 80%.
→ Pathognomic cf → Koplik spot [opp. to Lower 2nd molar]
→ Cfs → Retro auricular Origin of Rash
→ MC complicatn → Otitis media [Serous]
→ Late Rare complicatn → SSPE [sub acute sclerosing Pan encephalitis]
• 7/million cases • after 7-10 yrs
→ Vaccine → Live Attenuated
Distilled water - Diluent
9m & 16-24m, 0.5ml, SIC in (Rt) Arm
Edmonsten Zagreb strain
→ Immunoglobulin → 0.25ml/Kg/Body weight

MUMPS

- Cause → Myxovirus parootitis
- IP → 2-3 wks
- Source → case
- mode of Transmission → Resp (air Droplets)
- Period of communicability → 4-6 D ⟵ symptoms ⟶ 7D
- SAR → > 86%
- MC complicatn → Aseptic meningitis [child] [mc]
  → Orchitis [Adolescence]
- Vaccine → Live Attenuated
  Jeryll Lynn strain
- mc age group → 5-9 yrs

RUBEOLA → Measles

RUBULA → Mumps

RUBELLA → German Measles

RUBELLA

- Cause → RNA Togavirus
- IP → 14-21 D
- Source → cases [NO carriers — No Iceberg phenomenon]
- mode of Transmission → Resp. [Air droplets]
- Period of communicability → 1 WK ⟵ Symptoms ⟶ 1 WK after rash
- Vaccine → Live attenuated
  RA 27|3 strain
  CI in pregnancy
  1st priority group
  - Non Pregnant Non Lactating Reproductive ♀
    15 - 49 yrs ♀
- Congenital Rubella syndrome → Triad [1st trimester]
  CVD [PDA]
  cataract
  Sensory Neural Deafness [Early II Trimester]

INFLUENZA

- Cause → Orthomyxo virus
  Type A [mcc of epidemics]
  Type B [only cause of pandemics]
  Type C
  Type A epidemic — once/ 2-3yrs
  Type B epidemic — once/ 4-7yrs
  Type C epidemic — once/ 10-15 yrs

MC Type → H_3N_2

SWINE FLU H_1N_1

Avian flu H_5N_1

Avian flu [china 2013] H_7N_9

Antigenic variations	Antigenic Drift	Antigenic shift
	d/t point mutation	d/t genetic reassortment
	gradual	sudden
	EPIDEMICS	PANDEMICS

IP → 18-72 hrs [1-3D]

→ 1-2D ⟵ Symptoms ⟶ 1-2D

H_1N_1 [Swine Flu]

2009, Mexico

Risk factors →
- child / infants < 2yrs
- Pregnancy
- Old aged > 65yrs
- COPD
- chronic heart Disease
- chronic Renal Disease
- chronic Hepatic Disease
- on Aspirin therapy
- morbid obesity

Lab diagnosis → RT-PCR [most sensitive

Sample → Nasopharyngeal swabs

DOC →
1. Oseltamivir
   75 mg BD × 5 days
2. Zanamivir

Bird flu, H_5N_1

1997, Hong Kong

DOC - oseltamivir

Bird flu, H_7N_9

2013, china

DOC - Oseltamivir
Zanamivir

Vaccine →
- Live [Nasal vaccine]
- Killed
  - Strain - A7/California 2009
  - priority group
    - Pregnancy
    - > 6m child chronic disease
    - 15-49 yrs adults

REVISED / NEW GUIDLINES ON CATEGORIZATION OF SEASONAL INFLUENZA A H1N1 CASES 2019-20

CATEGORY A	CATEGORY B 1	CATEGORY B 2	CATEGORY C
Mild fever	Category A	Category A	Category A & B
plus	plus	plus	plus
cough / sore throat	→ high grade fever	children ī mild illness ī	→ breathlessness
With or Without	→ Severe sore throat	predisposing risk factors	→ chest pain
→ Body ache		→ pregnant women	drowsiness
→ Headache		→ >/ 65 yrs of age	hypotension
→ Diarrhea		→ Patients ī	hemoptysis
→ vomiting		Lung disease /	cyanosis
		Heart disease /	children ī
		Liver disease /	somnolence
		Kidney disease /	High persistent
		Blood disorders /	Fever
		Diabetes /	inability to feed
		Neurological	Well
		disorders /	convulsions
		cancer /	Shortness of breath
		HIV / AIDS /	difficulty in breathing
		Long term	worsening of
		cortisone therapy	chronic disease
TREATMENT GUIDELINES			
NO testing	Home isolation	Home isolation	Immediate hospitalizatn
NO Oseltamivir	may need Oseltamivir	give Oseltamivir	Start Oseltamivir
TIt symptoms	NO testing required	no testing required	Send throat swab
Home isolation		BSA where required	
Reassess after 48 hr			

BSA : Broad Spectrum Antibiotics

DIPTHERIA

Cause → Corynebacterium diphtherica

Source → Carriers [95%] > Cases

IP → 2-6 Days

Mode of Trasmission → Resp, Air droplets

Period of Communicability → 14-28 D from onset

[Non communicabe is >/ 2 cultures, 24 hrs apart -ive]

vaccine → DPT 6, 10, 14 WKS

16-24 m

5 yrs

Toxoid

0.5ml im

Carriers as main source

- Diphtheria
- M. Meningitis

Immunity status Test → SCHICK TEST

Albert stain

Intradermal Hypersensitivity Test
0.2ml shick toxin given
Reading > 96 Hrs
Positive – susceptible to Diphtheria
M_x – immediate immunizat^n
Negative – Immune, M_x – Nothing
Pseudo +ve – Hypersensitive, immune, M_x – Nothing
Combined – Hypersensitive, susceptible
M_x → Desensitizat^n

→ Replaced by Haemagglutinat^n Test

Pertussis / Whooping cough / 100 day cough

Cause → Bordetella pertussis
IP → 7 - 14 days
Source → cases [No carriers, No subclinicals]
SAR → >90%.
DOC → Erythromycin
Vaccine → DPT
Weakest component

Meningococcal Meningitis / cerebrospinal fever

Cause → N. Meningitidis [A[mc], B, C, D, 29E, W135, X, Y]
IP → 3-4 D
Source → Carriers > cases
Routes of Transmission → Resp, air droplets
CFR → >80%. ; ↓ with Dx & Rx → < 10%

DOC

cases → Penicillin
Carriers → Rifamplan

CHEMOPROPHYLAXIS

< 1 month age → Rifampicin
> 1 month age → Rifampicin
< 15 years age → Ceftriaxone
> 15 years age → ceftriaxone, Ciprofloxacin, Rifampicin

Vaccine → Killed cellular fract^n
CI in pregnancy & Age < 2yrs
first priority group – Early Adolescence [10-13 yrs]

Not for 'B'

- Not immunogenic

ARI Pneumonia

New ARI Guidlines, IMNCI [Integraled Mx of Neonate & child India] 2017-18 [RCH]

NO Pneumonia [Green]

cough/cold

Home

Inhaled Bronchodilator x 5D

Soothe throat

If cough >14 D → TB assess

If Wheeze → Asthma assess

follow up in 5D, advise the mother when to return immediately

Pneumonia [yellow]

Chest Indrawing

Fast breathing

RR >50 [2-12m]

RR >40 [12m-5y]

PHC

Oral Amoxycillin x 5D

Inhaled BD x 5D

Soothe the throat

If cough >14 D → TB assess

If Wheeze → Asthma assess

follow up in 3 Days, Advise mother when to return immediately

Severe Pneumonia/ very sever Disease [Pink]

Stridor in calm child

Any Danger signs

- inability to feed
- vomits
- H/O convulsions
- Convulsing Now
- Lethargic / unconscious

CHC/Hospital

First dose of referral antibiotic

Diazepam

Rx to prevent Low sugar

Keep the child warm

⇒ Young infant [0-2 months] → Very S. Dz (Severe)

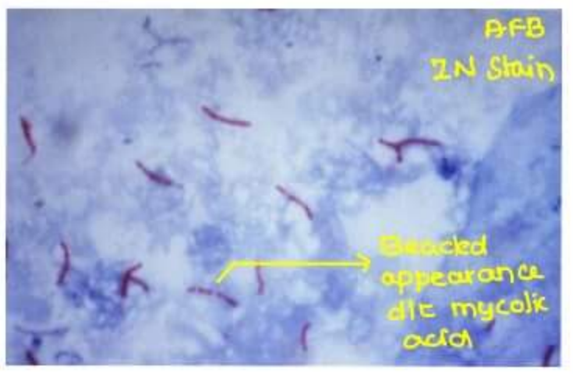
Severe chest Indrawings

General Danger Signs

Fast RR >60/min, fever >37.5, Body temp <35.5, No movement, Not feeding Convuls n

TUBERCULOSIS / WHITE PLAGE → Barometer of Socral welfare in India

Cause	→	M. tuberculosis
Source	→	cases [Human, Bovine]
Period of communicability	→	As long as not treated
Mode of transmission	→	Resp, Air droplets
IP	→	Weeks - months - years



EPIDEMIOLOGY OF TB - INDIA

Country ī highest TB Burden	India
ARI	1.5%.
Infected ī TB	40%.
Developing TB/day	5000/day
SS +ve per year	0.8 million
Deaths per year	0.37 million
1 case of TB infects/year	10-15 persons/year
Incidence of infection [ARI]	1-2%. [Tuberculin conversion index]
Prevalence of infection	40%. [Tuberculin test]
Incidence/Prevalence of disease	Sputum smear Examination

Immunity Status Test → Montoux Test

Antigen – Purified Protein Derivative
Tuberculin – 50000 TU/mg
Strain – PPD RT-23 ± tween 80
Dose – 1 TU in 0.1 ml
– ID on flexor aspect of fore arm
Reading – > 72 hrs
[Indurat^{n} – horizontal max]

>9mm – Positive – Infect^{n} [current, past]
6-9 mm – Doubtful
<6mm – Negative – Never infected

False ⊕ – BCG high coverage
– Faulty technique

False ⊖ – HIV, immunosuppression, Pertussis, Measles, chicken pox

Type IV delayed Hypersensitivity

VACCINE → BCG

Live attenuated
Danish 1331 from M. Bovis by 239 serial sub cultures over 13 yrs
Normal saline – Diluent
At birth,
0.05 ml < 28 days age } ID (LT) Deltoid
0.1 ml ≥ 28 days age }
0 – 80%.
0% against pulm. TB
~ 50% against severe forms
Durat^{n} → 20 years [not life long]

→ National TB Institute [NTI], Bangalore
TB Research centre [TRC], Chennai
National Institute for TB & Respiratory Diseases [NITRD], Delhi

→ Mc oppurtunistic infect^{n} of HIV in India → TB
DM is an independent risk factor for TB

→ MDR TB → Resistance to Isoniazid & Rifampicin

XDR TB → Resistance to

1. INH & Rifampicin both ⊕
2. Any one Fluoroquinolones ⊕

Any one second line injectables

Kanamycin

Amikacin

Capreomycin

→ TB is a propagated epidemic

Anti TB Day → 24 March

Robert KOCH → TB Bacillus

→ END TB Strategy

Vision	→	TB free world
Reduction of TB incidence rate	→	>90% } By 2035
Reduct^{n} of Deaths	→	>95% } By 2035
TB affected families facing catastrophic costs	→	ZERO } By 2035

→ TB Mission 2020

MOHFW, GOI

Eliminate by 2020

1. Free diagnosis & R$_{f}$
2. Ban on commercial serology
3. New Anti TB drug
4. Notificat^{n} of TB

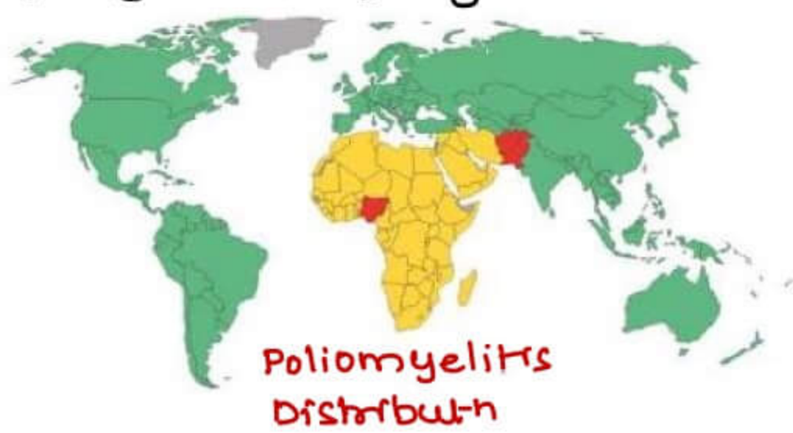
Intestinal Infections & Worm infestations

POLIOMYELITIS

World → 3 Endemic countries → Pakistan, Afganistan, Nigeria

India → Polio – free on 27-03-2014

Last case → 13-01-2011



Polio virus

P_1 → mcc of epidemics

P_2 → Most antigenic

most easily eradicable

Mcc of VDPV [Vaccine Derived Polio virus]

P_2 Eradication → 20 Sep 2015

P_3 → mcc of VAPP [Vaccine Associated Paralytic Polio]

→ P_3 Eradication → 17 oct 2019 [certificate], 24 Oct 2019 [Declaration]

Reservoir → Man

Route of Transmission → feco oral

IP → 4-33D [~7-14D]

Clinical types →

Inapparent	95%
Minor / Abortive	4-8%
Non paralytic	1%
Paralytic	<1%

VACCINE → OPV SABIN → IPV SALK

P_1 & P_3 [Bivalent]

HEPATITIS

A	Entero V 72 [PICORNA V]	→ 15-45D	feco-oral → Mc in children in India	
B	HepaDNA virus	→ 45-180D	} Blood sexual parenteral	
C	Hepaci virus	→ 30-120D		
D	Viroids like	→ 30-90D		
E	Calcivirus	→ 21-45D	feco-oral → Mc in Adults	
			Mcc mortality in pregnancy	

Hepatitis B — Serum markers

HBS Ag → 1st Antigen to appear [Australia Ag], Epidemiological marker

HBC Ag → Rarely appears alone

HBe Ag → Marker of infectivity, Indicates Active viral replicatn

Anti HBC → 1st Antibody to appear, Marker of Acute Hep B [IgM]

Anti HBe → Marker of good prognosis, viral replicatn has stopped

Anti HBS → Marker of end of period of communicability

→ vaccinated individuals

CHOLERA

- Cause → Vibrio cholera - ELTOR [Hybrid] - mc subtype in India now
- Route of T → Feco-Oral
- IP → 1-2D
- CF's → Rice watery diarrhoea
- Treatment
  - Adults → Doxycycline
  - Child, Pregnancy → Azithromycin
  - Chemoprophylaxis → Tetracycline
- Epidemic → 1st step → verificatn of Diagnosis
  → Most Imp prophylactic measure is H. Education

TYPHOID

- Cause → Salmonella typhi
- Route of T → Feco-Oral
- IP → 10 - 14 Days
- Cf's → PEA SOUP Diarrhea
  Coated tongue
  Rose spots
  Step ladder pyrexia
- Diagnosis
  - B → Blood culture [1st WK] → Best test
  - A → Anti Bodies / Widal [2nd WK]
  - S → Stool culture [3rd WK]
  - U → Urine culture [4th WK]
- DOC
  - Cases → Cephalosporins, Quinolones
  - Carriers → Ampicillin / Amoxycillin + probenecid x 6wks
- Vaccine → Typhoral
  Typhim - Vi
  TAB

ORS → Medical super discovery of last century

WHO Reduced Osmolarity ORS →

NaCl	2.6 gm	Na^+	75
KCl	1.5 gm	K^+	20
Na Citrate	2.9 gm	Cl^-	65
Glucose	13.5 gm	Citrate	10
	20.5 gm	Glucose	75
			245 mmol/ltr

Re SO MAL → Rehydration Solution for MALnourished
- Sodium → halved → 45 mmol/L
- Potassium → Doubled → 40 mmol/L

SUPER ORS → Rice / Starch / Alanine Based [NOT MONOSUGARS]

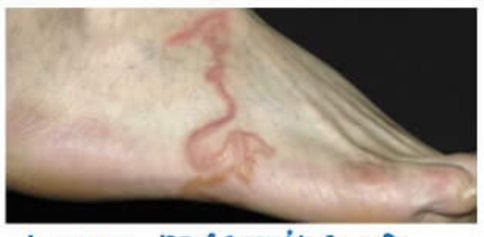
WORM INFESTATIONS

GUINEA WORM

- Cause → Dracunculus Medinensis
- Last case in India → July 1996 [Jodhpoor] from step well
- Eliminatd in India → feb 2000
- Type → Water Based, cyclodevelopmental
- Treatment → Niridazole
  Mebendazole
  Metronidazole

ROUND WORM

- Cause → Ascaris lumbricoides
- IP → 2 months
- Mode of T → faeco oral
- DOC → Albendazole



Larva migrans of Hookworm

- Mc worm infestatn in India & world

HOOK WORM

- Cause → Ancylosoma duodenale, Necator Americanus
- Mode of T → Penetratn of skin of foot
- IP → 5 wks - 9 months [A. duodenale], 7 wks [N. Americanus]
- Associatn → IDA → 0.03 - 0.2 ml / worm / day [~0.1 ml/wid]
  Hypo Albuminemia
- Endemic Index → CHANDLER'S INDEX [CI] = No. of eggs / gm stool
  Eggs measured by KATOKATZ Technique
  CI > 300 → Major Public health Problem

TAPE WORM

- Cause → Taenia Solium, T. Saginata
- Host → Definitive – Man
  Intermediate – Pigs [T. solium]
  cattle [T. saginata]
- Mode of T → consumptn of contaminated meat
- IP → 8 - 14 wks
- DOC → Praziquantel
  Niclosamine
  [Albendazole – for cysticercosis]

NATIONAL DEWORMING DAY

Dates	10 February & 10 August
Objective	School & pre school children
Beneficiaries	1 - 19 yrs old
Linkage	Vitamin A prophylaxis
Dosage	Albendazole 400 mg Stat → 1/2 tablet [1-2 years age] → 1 tablet [2 - 19 years age]

VBDs, ARBOVIRAL & VIRAL INFECTIONS, SURFACE INFECTION

VECTOR BORNE DISEASES

DENGUE

Classificatⁿ →

ARBO VIRUSES		
Group A	Group B	Others
SindBis	JE	Sandfly fever
Chikungunya fever	KFD	Chandipura
	Dengue	Ganjam
	West Nile fever	Dhori
		Minnal

Cause → Group B Arbovirus
- D1 - mc subtype causing Dengue
- D2
- D3
- D4

Vector → Aedes aegypti

Reservoir → Man, Aedes

IP → 3 - 10 Days

Diagnosis

Clinically → Torniquet Test
- ≥ 10 Spots → Dengue fever
- ≥ 20 Spots → Dengue haemorrhagic fever

Serological → NS-1 Antigen Test [comes tive even in 1st week]

Presentation →

Dengue Fever	Dengue Haem. Fever	Dengue Shock Syndrome
Backbone fever	Fever	DHF ⊕
	Haemorrhagic features	Shock
	Thrombocytopenia	
	Haemoconcentratⁿ	

Global Strategy for Preventⁿ & Control [2012-2020]

→ Reduce Dengue mortality by 50% by 2020
Reduce Dengue morbidity by 25% by 2020
To estimate true Burden by 2015

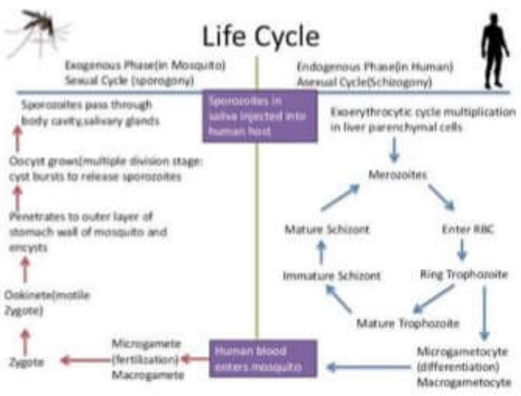
Vaccine → DENGAVAXIA
- Live Recombinant tetravalent vaccine
- Strain → CYD - TDV
- Recommended Age group → 9-45 yrs
- Schedule → 0, 6m, 12m
- Productⁿ → Replacement of Premembrane and envelop structural genes of YF 17-D strain & Dengue 4 serotypes

MALARIA

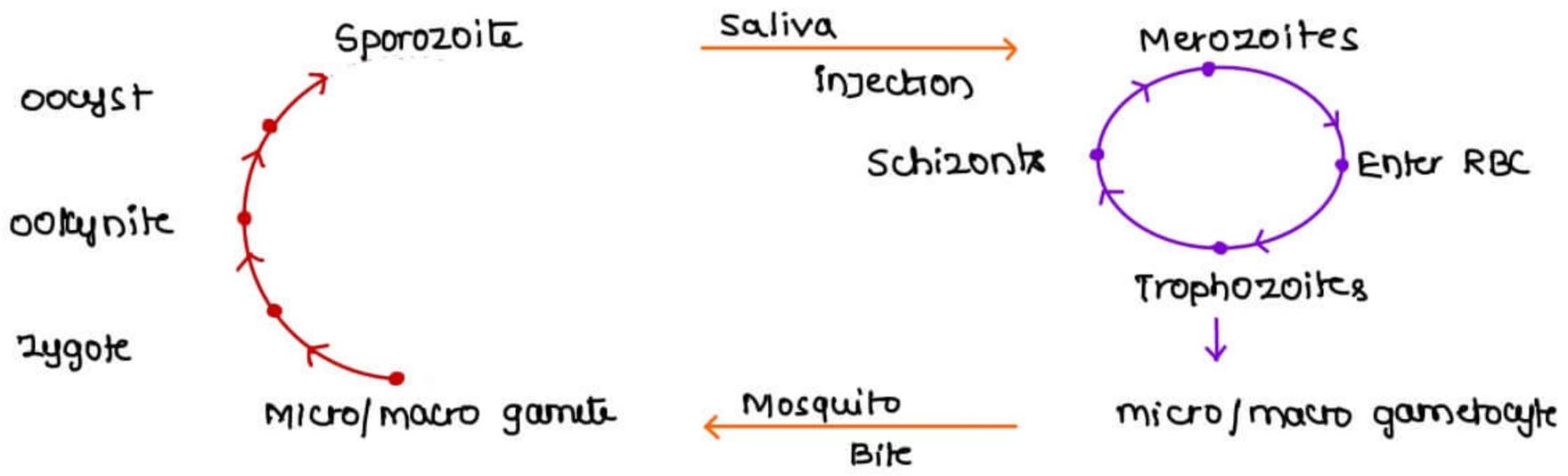
				IP
Cause	→	P. Vivax	→	8-17D ~ 14 Days
		P. Falciparum		9-14D ~ 12 Days
		P. Malariae		18-40D ~ 28 Days
		P. Ovale		16-18D ~ 17 Days

→ mc subtype in India falciparum
Only cause of Death - Falciparum
→ No relapse → Falciparum & Malariae [Recrudescence present]

→ Infective form → Sporozoite



SPOROGONY	SCHIZOGONY
sexual cycle	Asexual cycle
Exogenous phase	Endogenous phase
Mosquito	Man



Vector → Anopheles Culicifacies [Rural]
Anopheles Stephensi [Urban]

FILARIASIS

	LYMPHATIC FORM	BRUGIAN
Cause	Wuchereria bancrofti	Brugia malayi
Vector	Culex quinquefasciatus	Mansonia
DOC	DEC [Di Ethyl carbamazene] → 6mg/kg x 12 Days	

→ Ideal time for blood collection → 8.30 pm to 12 Am midnight

GLOBAL PROGRAM TO ELIMINATE LYMPHATIC FILARIASIS [GPELF] [WHO]

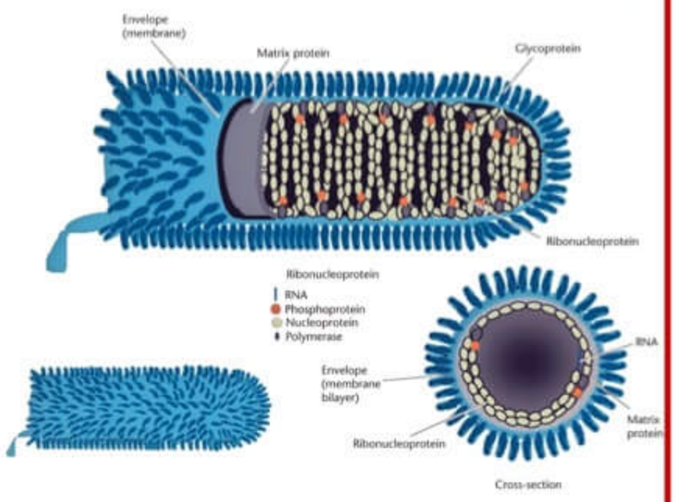
1. STOP THE SPREAD OF INFECTION → MASS DRUG ADMINISTRATION [MDA]
   → Diethylcarbamazine Citrate [DEC] + Albendazole or
   → Ivermectin + Albendazole

2. ALLEVIATE SUFFERING → Morbidity Management & Disability Prevention [MMDP]

ACCELERATED PLAN FOR ELIMINATION OF LYMPHATIC FILARIASIS [APELF], INDIA 2018

→ Triple drug therapy or IDA [Ivermectin, DEC, Albendazole]
→ community engagement for successful MDA implementation
→ DEC medicated salt
→ House - to - House visit Advocacy

RABIES



RABIES VIRUS

- Cause → Lyssavirus 1 [Rhabdovirus family]
- IP → 20-60 Days
- Pathognomic
  - CP → Hydrophobia
  - MF → Negri bodies in hippocampus
- Mode of T. → Animal Bites except human & rat bite
- Barrier → Water
- Local wound Rx → Soap & running water for 5-10 min
  No sutures generally
- VACCINES → developed from fixed virus type
  - PCECV – Purified chick Embryo cell vaccine
    - RABIPUR, VAXORAB
  - PVRV – Purified verocell vaccine
    - VERORAB, ABHAY RAB, INDIRA
- Anti Rabies serum → HRIG – Human Rabies ImmunoGlobulin – 20 IU/kg
  ERIG – Equine Rabies ImmunoGlobulin – 40 IU/kg

YELLOW FEVER / AMERICAN PLAGUE

- Cause → Flavivirus Fibricus
- Reservoir → Monkeys, Man, Aedes
- IP → 2 – 6 Days – Quarantine period
- CFR → 80%.
- Vaccine → Live Attenuated
  Strain – 17D
  Diluent – cold physiological Saline
  temp – $-30^{\circ}C \leftrightarrow +5^{\circ}C$
  Validity of certificate – 10 days to life long

Indices of Surveillance →

1. Container Index $= \frac{C^{+}}{C} \times 100$ — C = containers, + = breeding
2. House Index [Aedes aegypti Index] $= \frac{H^{+}}{H} \times 100$
3. Breteau Index $= \frac{C^{+}}{H} \times 100$

YF control measures →
1. Area around airport kept free of aedes > 400 m
2. Breteau index < 1%.

EYE [Elimination Yellow Fever Epidemic] STRATEGY [WHO, UNICEF, GAVI]

- → Project at-risk population
- → Prevent international spread of YF
- → Contains outbreaks rapidly

Japanese Encephalitis

Cause	→	Group B Arbovirus
Vector	→	Culex triteniorhynchus [mc in india]
Amplifier Host	→	Pigs
Actual Host	→	ARDIED BIRDS [Ducks, fouls]
Accidental Host	→	Man
Mosquito Attractants	→	Cattle / Horses
IP	→	5-15 D
CFR	→	30
Age Group	→	1-15yr
Vaccines	→	Live Strain – SA-14-14-2 at 9m, 16-24 months
		Killed Strain – Nakayama, Beijing P_3 [earlier]

KFD / Kyasanur Forest Disease / Monkey Disease

Cause	→	Group B togavirus
Reservoir	→	Rats, Squirrels
Amplifier host	→	Monkeys
Accidental host	→	Man
Vectors	→	Hemophysalis spinigera → Hard tick [in india]
	→	Soft tick [out side India]
IP	→	3-8 days
Vaccine	→	Killed vaccine

Plague

Cause	→	Yersinia pestis
Reservoir	→	Wild rodent [Tatera indica]
vector	→	Rat flea [Xenopsylla cheopsis – most efficient in India]
Source	→	Rats → Bubonic & Septicemia
	→	Man → Pneumonic
Mode of T	→	Rat flea Bite or Air droplets
Types	→	Bubonic → 2-7 days → most common
		Pneumonic → 1-3 days
		Septicemic → 2-7 days

DOC

cases	→	Streptomycin
chemoprophylaxic	→	Tetracyclin

RICKETTSIAL DISEASES

		Cause	Vector	Reservoir
Typhus Group	Epidemic Typhus	R. Prowazeki	Louse	Man
	Endemic Typhus	R. Typhi	Flea	Rodents
	Scrub Typhus	R. Tsutsugamushi	Trombiculid Mite	Rodents
Spotted Fever Group	Indian Tick Typhus	R. conori	Tick	Rodents
	RMSF	R. rickettsii	Tick	Rodents
	R. Fox	R. Akari	Mite	Rodents
	Q fever	Coxiella	⊘	Cattle
	Trench fever	Bartonella	Louse	Man

DOC → Tetracycline

BRIL ZINSER DISEASE → Recrudescence of Epidemic Typhus

LEISHMANIASIS

VISCERAL/KALA AZAR	CUTANEOUS/Oriental sore/ Delhi boil / Bagdad boil	MUCOCUTANEOUS
L. Donovani Sand fly [Phlebotamous]	L. tropica sand fly	L. Braziliences Sand fly [DDT DOC]

IP → 10 D → 2yrs [~ 1-4 months]

Serological Dx → rK 39 Ag & ELISA, DAT, IFAT

Immunity status test → Montenegro Test
- Leishmanin Antigen used
- Reading after 48-72 hrs

DOC → LAMB [Liposomal Amphotericin B]

TRACHOMA / ROUGH EYE → Free on 8-12-2017

Cause → Chlamydia trachomatis

IP → 5-12 days

Mode of T. → fomites, flies, Sexual

Field Diagnosis [≥ 2 out of 4] → Follicles on upper tarsal Conjunctiva
Limbal follicles [Herbert pits]
Pannus
Conjunctival Scarring

WHO Classificatn

TIF [Trachoma Inflammatn follicular] → ≥ 5 large follicles on upper tarsal Conj.

TII [Trachoma Inflammatn Intensity] → > 50% of Deep tarsal vessels of UTC covered

DOC → Azithromycin

Mass Treatment if prevention of moderate/severe trachoma in < 10 yrs age is > 10%.

Tetanus

Cause → Clostridium tetani

Source → Soil

Reservoir → Soil

IP → 6-10 days

Period of Communicability → None

NNT Eliminatⁿ Criteria → 1. Rate < 0.1 case / 1000 LB
(14 July 2016) 2. Coverage TT > 90%.
3. Attended deliveries > 75%

CATEGORY	Clean Wound <6H	Other Wounds
(A) CC <5yrs	Nothing	Nothing
(B) CC 5-10yrs	1 Dose	1 Dose
(C) CC >10 yrs	1 Dose	1 Dose + TIG
(D) Not CC unknown	Complete course	Complete course + TIG

CC - complete course

LEPROSY, HIV & STDS

LEPROSY / HANSEN'S DISEASE

Cause → Mycobacterium leprae

Mode of T. → Air Droplets, Skin Contact, Transplacental, Breast Feeding, Insect bite, Tattoo, Corneal, Organ transplantaⁿ

Epidemiology INDIA

ANCDR [Annual New Case detection Rate] → 9.27 | 1,00,000

Prevalence → 0.67 | 10,000

Eliminatⁿ level Dec 2005 → <1 case | 10,000

RIDLEY JOPLING CLASSIFICATION

TT →	Highest CMI +++++ Lepromin test	Pauci Bacillary
BT →	MC in India	Paci Bacillary
BB		Multi Bacillary
BL		Multi Bacillary
LL →	Highest Bacillary load Most Infectious	Multi Bacillary

→ Immuno histological classificatⁿ

→ first sensatⁿ lost → cold temperature

→ Treatment → MDT [multi drug Therapy]

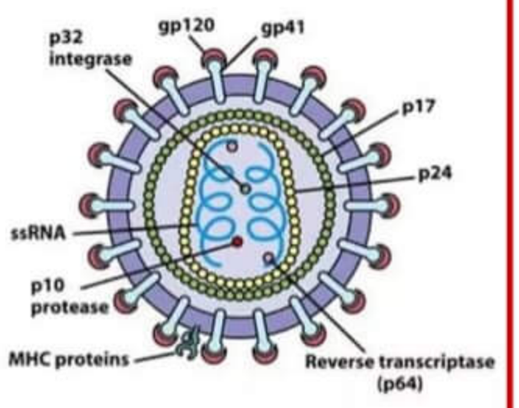
→ oldest disease known → Leprosy
oldest disease ī a known cause → Scabies
oldest backrial disease ī a known cause → Anthrax

→ Leprosy can't be Eliminated
1. No proper vaccine
2. No artificial culture media
3. Long & variable incubatⁿ period - most imp. reason
4. Multiple routes of transmission

→ Global Leprosy strategy 2016 - 2020
1. No. of children Dx ī leprosy → zero
2. No. of newly Dx patients ī deformity → <1%
3. No. of countries allowing discriminatⁿ → zero

HIV / AIDS

Cause → HIV [HTLV - III , Lymphadenopathy associated virus]
Mode of T → Sexual → mc mode [>90%]
least efficient routi [<0.01 - 0.1%]
Blood → Least common mode [<0.5%]
Most efficient route [>90% chances]
Needle / Syringes
Vertical



Prevalence → 0.22 %
MC age group → 30 - 44 yrs

→ 1st case → 1981 - USA
HIV virus → 1983 - HIV1 discovery
1986 - HIV2 discovery
} Robert Galo -
Montagnier - Sinnousi
Got NOBEL PRIZE

→ 1st case India → Chennai 1986
Highest cases → Maharastra
High Prevalence → Tamilnadu, Maharastra, Andhra, Karnataka, Manipur, Nagaland, mizoram
Moderate prevalence → Gujarat, GOA, Pondicherry
Highest prevalence state → Mizoram [2%]
Fastest increasing → Andhra Pradesh
Highest prevalence city → Mumbai
mc route in Manipur → Inj. Drug Users

STATES	HRG [High Risk Group]	ANC [Antenatal clinic]	Districts
High Prevalence	>5%	>1%	A
Moderate Prevalence	>5%	<1%	B
Low prevalence	<5%	<1%	C
Poor data or Low prevalence in last 3 yrs			D

→ Mother to child transmission Rate → 30%
MTCT through Breast feeding → 12-16%
In Developing countries Breast feeding is not CI except in Higher Socio Eco. ♀

MC Opportunistic infecth in World → Pneumocystis carini Pneumonia
[Pneumocystis jiroveci pneumonia]
MC opportunistic infecth in India → TB [upto 40% Co-infecth]

UNAIDS 90-90-90 TARGET

→ Reaching 90-90-90 in 2020 means ending the AIDS epidemic is possible by 2030
→ An ambitious but achievable target for HIV treatment by 2020

→ 90% of people living ī HIV know their status
90% of those who test positive have access to treatment
90% of people under treatment have an undetectable viral load

UNAIDS 95-95-95 TARGET

→ Reaching 95-95-95 in 2024 means ending the AIDS epidemic is possible by 2030
→ An ambitious but achievable target for HIV treatment by 2024

→ 95% of people living ī HIV know their status
95% of those who test positive have access to treatment
95% of people under treatment have an undetectable viral load

OTHER STIs

	IP	CAUSE
Syphilis	9-90 Days	Treponema pallidum
LGV	3-12 Days	chlamydia trachomatis
Donovanosis	3-21 Days	calymmatobacterium granulomatis
Chanchroid	3-5 Days	Hemophilus ducreyi
Gonorrhoea	1-5 Days	Neisseria gonorrhaeae

CASE DETECTION IN A STD CONTROL PROGRAMME

→ screening
→ contact tracing
→ cluster testing

SURAKSHA CLINIC

→ Blood sample testing
→ counseling
→ Syndromic case management [RTI/STI/RPR Kits]

STD COLOUR CODED KITS

KIT	COLOUR	SYNDROME	CONTENTS
1	Grey	urethral / Anorectal / cervical discharge / SS #	Azithromycin, cefixime
2	Green	vaginal discharge	Secnidazole, Fluconazole
3	White	Genito - ulcerative disease [non - herpetic]*	Azithromycin, Benzathinpenicillin
4	Blue	Genito - ulcerative disease [herpetic]	Azithromycin, Doxycycline
5	Red	Lower abdominal pain	Acyclovir
6	Yellow		cefixime, metronidazole, Doxycycline
7	Black	Inguinal bubo	Azithromycin, Doxycycline

TREPONEMATOSIS

	SYPHILIS	YAWS	PINTA
cause	T. Pallidum	T. pertenue	T. carateum
Route	Sexual / venereal	Direct skin contact	Direct skin contact
DOC	Benzathine Penicillin G	Benzathine Penicillin G	Benzathine Penicillin G

→ Yaws eliminated from India in July' 2016

OTHER COMMUNICABLE DISEASES

ZOONOSES

ANTHROPOZOONOSES → from animal to man
Rabies, Plague, Anthrax, Echinococcosis

ZOOANTHROPONOSES → from man to animal
Human TB in cattle

AMPHIXENOSES → Either direct^{h}
Trypanosoma cruzi, Schistosoma japonicum

1 Direct zoonoses → occur through Direct contact / fomite / mechanical vector
Rabies, Brucellosis

2. Cyclo zoonoses → involvement of >1 vertebrate species
Taeniasis, Echinococcosis

3 Meta zoonoses → Involvement of invertebrate vector
Plague, Arboviral Diseases

4 Sapro zoonoses → Non animal reservoir
Larva migrains, Mycoses

FOOD POISONING

		IP
1	Staphylococcal FP →	1 - 6 hrs
2	B. cereus FP [emetic] →	1 - 6 hrs
3	B.C. FP [non emetic] →	12-24 hrs
4	Cl. perfringes FP →	6 - 24 hrs
5	Salmonella FP →	12 - 24 hrs
6	Botulism FP →	12 - 36 hrs

Emerging & Re emerging Diseases

1. CCF [crimean Congofever]

Cause → Nairo virus [Bunya Virus]
Vector → Hyaloma [Hard Tick]
IP → 1 - 3 days
CFR → 30 %
DOC → Ribavirin

2. NIPHA

Cause → Henapivirus
Mode of T → consumptn of fruits & bat's secretions

3 SARS / MERS → by Corona virus

4 EBOLA

IP → 2 - 21 Days
Route of T → contaminated Body fluids, Sexual

5. ZIKA

Route of T → Aedes aegypti, MTCT, Blood, Sexual
Diagnosis → RT PCR Technique

6. LITCHI VIRUS DISEASE

Hypoglycemia in empty stomach PEM child
Chemical → MCPG

CHD

Prudent Diet

→ Overall Goal is to reduce $\frac{\text{CHOLESTEROL}}{\text{HDL}}$ RATIO → < 3.5

→ Dietary goals

1. Reduct^{n} of fat intake → < 30%.
2. Reduct^{n} of Saturated fat intake → < 7%.
3. Reduct^{n} of Salt intake → < 5g / Day
4. Reduct^{n} of cholesterol intake → < 200 mg / Day
5. ↑ complex carbohydrates consumpt^{n}
6. Avoid alcohol

NON MODIFIABLE RISK FACTORS

1. Age [Peak age 51-60 yrs India]
2. Sex [M > F India]
3. Family History
4. Genetic factors
5. Personality type A

MODIFIABLE RISK FACTORS

1. Smoking
2. High BP
3. Elevated S. Cholesterol
4. DM
5. Obesity
6. Sedentary Life style
7. Stress

→ Most Direct Associat^{n} → LDL

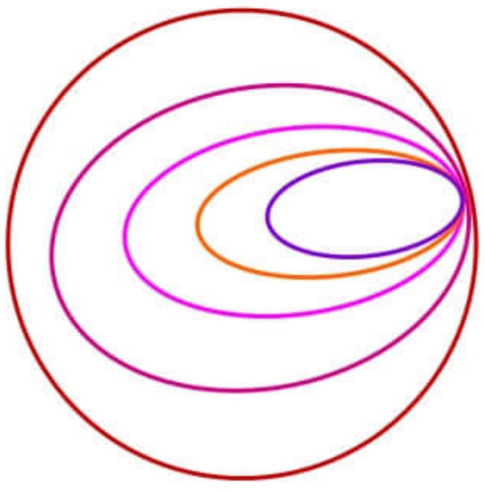
PREVENTION & CONTROL

1. LDL level → < 100 mg / dl
2. HDL level → > 40 mg / dl
3. Serum cholesterol level → < 200 mg / dl

HYPERTENSION

ROLE OF HALVES

→ Only shown by HTN



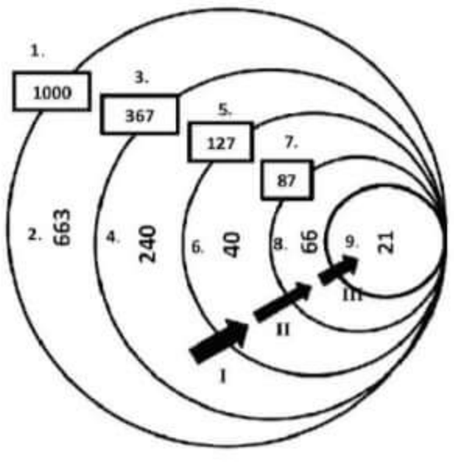
Total Populat^{n}

50% HTN

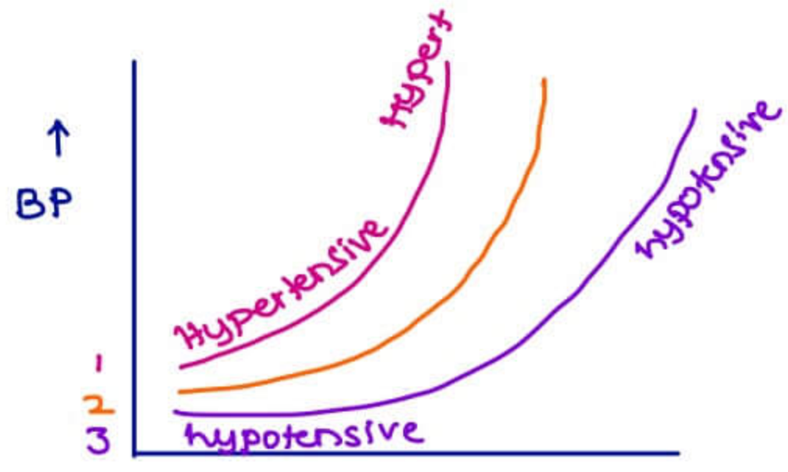
50% Symptomatic

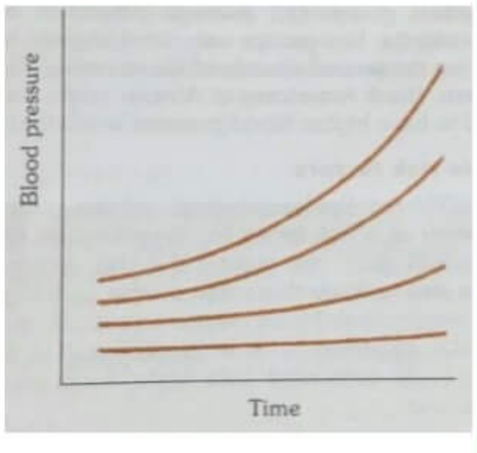
50% seek Rx

50% get adequate Rx



TRACING OF BP





New BP classificatn by ACC/AHA' 2017

SBP		DBP		
< 120	&	< 80	→	Normal BP
120-129	&	< 80	→	Elevated BP
130-139	&	80-89	→	Stage 1 HTN
140-159	&	90-99	→	Stage 2 HTN
≥ 160	&	≥ 100	→	Stage 2 HTN

LIFESTYLE MODIFICATIONS TO MANAGE HYPERTENSION

- → Weight Reduction [Reduce by 5-20 mm Hg / 10 Kg BW loss]
- → Adopt DASH [Dietary approach to stop HTN] diet plan
  - → Reduce by 8-14 mm Hg
  - → Diet rich in fruits / vegetables, Low fat dairy products
  - → reduced saturated fat, Total fat
- → Dietary sodium reduction < 100 mEq/Day [Reduce by 2-8 mm Hg]
- → Physical Activity [Reduce by 4-9 mm Hg]
  - → Regular aerobic physical activity
  - → > 30 min/day, most days of week
- → Moderation of Alcohol consumption [Reduce by 2-4 mm Hg]
  - → Limit alcohol consumption < 2 drinks/day

DIABETES MELLITUS

DIAGNOSIS

OGT		→	venous plasma glucose level at 2hrs > 200 mg/dL
FBS		→	> 126 mg/dL
HbA1C		→	> 6.5%
Glycemic Index		→	Area under 2 hr Glucose response curve
Low GI	< 55	→	fruits, vegetables, Grains
Medium GI	56-69	→	Sucrose, Basmati Rice
High GI	≥ 70	→	White bread, Corn flakes

Rheumatic fever

Cause	→	Group A β hemolytic Streptococci [MS - mc]
Prevalence	→	5-7 / 1000
Age group	→	5-15 years of age
Treatment		
Primary	→	1.2 M units single dose im
Secondary	→	1.2 M units @ 3 Wkly intervals × 5 yrs or 18 yrs of age whichever is later

Revised Jones Criteria →

Initial ARF

2 Major (or)

1 Major + 2 minor

Recurrent ARF

2 Major (or)

1 major + 2 minor (or)

3 minor

MAJOR	MINOR
Carditis Arthritis — Poly A [low risk p] / mono A or poly A / Poly Arthralgia [med & High risk] Chorea Erythema marginatum Sub cutaneous nodules	Low Risk Populatn Poly Arthralgia Fever [⩾ 38.5] ESR ⩾ 60, CRP ⩾ 3 Prolonged PR interval
	Moderate / High Risk P. mono arthralgia Fever [⩾ 38.5°] ESR ⩾ 30, CRP ⩾ 3.0 Prolonged PR interval

LATEST CANCER DATA - INDIA [WHO GLOBOCAN 2018]

→	Highest Incidence [Total Population]	→ Breast cancer
→	Highest Incidence [Total male population]	→ Lip/ oral cavity cancer
→	Highest Incidence [Total Female population]	→ Breast cancer
→	Highest prevalence	→ Breast cancer
→	Highest mortality	→ Breast cancer

OBESITY

I. BMI /

Quetlets index

$\frac{W}{H^2}$ $\frac{Kg}{m^2}$

Global classification

Normal BMI	→	18.5	⟷	25
over wt / Pre obese	→	25	⟷	30
Obesity	→	⩾ 30		
underweight	→	< 18.5		

Percentile classificatn

Normal weight	→	5th	⟷	85th
Over wt / Pre Obese	→	85th	⟷	95th
Obesity	→	⩾ 95th		
Under weight	→	< 5th		

Indian classificatn	→	18.5	⟷	22.99
Normal weight	→	23	⟷	25
Over wt / Pre Obese	→	⩾ 25		
Obesity	→	< 18.5		
Under weight				

II PONDERAL INDEX = $\frac{Ht}{\sqrt[3]{wt}}$ $\frac{cm}{\sqrt[3]{kg}}$

III BROCA'S INDEX = $Ht_{cm} - 100$

IV CORPULENCE INDEX = $\frac{\text{Actual wt}}{\text{Desirable wt}}$ cut off — ≤ 1.2

V LORENTZ FORMULA = $Ht_{cm} - 100 - \frac{Hcm - 150}{2\,[WoM],\ 4\,[Men]}$

VI SFT [Skin fold thickness] = i Herpenden callipers

Sum $\geq$ 40 cm In Boys
$\geq$ 50 cm In Girls
} Obesity ⊕nt

1. Triceps — Single best
2. Biceps
3. Supra iliac
4. Subscapular

$\geq$ 18 mm in B
$\geq$ 32 mm in G
} Obesity ⊕

VII WHR [waist Hip Ratio] =
> 1.0 [males]
> 0.85 [females]
} ↑ Risk of CVD

VIII WHtR [waist Height R] = < 0.5 → CVD Risk ↑
Independent of Age & Sex

BLINDNESS

WHO Blind → < 3/60 In better eye after Best possible correctn

Q) Visual Acuity of Rt eye < 3/60 & lt eye > 3/60. Blind ? → No
Q) < 3/60 in both eyes. Blind → Yes
Q) < 3/60 in both eyes & after correctn > 3/60. Blind ? → No

NPCB Blind → < 3/60 In better eye after best possible correctn

WHO categories of visual Impairement

Categories				
0			> 6/18	
1	L	Low Vision	< 6/18 – 6/60	
2	E	Economic Blindness	< 6/60 – 3/60	→ Work vision
3	S	Social Blindness	< 3/60 – 1/60	→ Walk vision
4	M	Manifest Blindness	< 1/60 – P.L ⊕	
5	A	Absolute Blindness	Percepth of Light ⊖	
9			Unspecified causes	

MCC Blindness → Cataract (62%) > Refractive Errors (19.7%)
Low vision → Cataract (77%)
Ocular morbidity → Refractive error
Prevalence
using <6/60 → 0.36 %. [Latest 2019-20 value]

RNTCP Revised National TB Control Programme, 1992

HISTORY →
NTP 1962
↓ ← DOTS [Directly Observed Rx Short course]
Consumption
RNTCP 1992

OBJECTIVES → 90/90
1. >90% cure rate
2. >90% case detection rate

Components of DOTS →
1. Accountability
2. Good quality sputum microscopy
3. Political commitment
4. Uninterrupted supply of good quality drugs
5. Direct observatn therapy

NEW CHANGES 2017-18 →
CxR, CBNAAT Test in Diagnosis
Daily Regimens & fixed dose combinations
Active case finding
Drug Resistant TB Rx
Bedaquiline
Informatn Communicable Technology enabled adherence (DOTS-99)
ICT enabled surveillance (NIKSHAY)
Weight Bands 4 for Adults & 6 for children
Merger of RNTCP & NACP
No extensn for IP
Incentives ↑ed

DIAGNOSIS OF TB →
1 Microscopy
- In staining
- LED fluorence microscopy

2 Culture
- LJ medium
- ALC (Automated liquid culture) systems → BACTEC
- Drug sensitivity testing

3 Rapid molecular Dx Testing
- Line Probe Assay
- CBNAAT [catridge based Nucleic Acid amplificatn test]
  - basis for gene expert / MTB / Rif

4 Other - CXR
Tuberculin skin test

~~IGRA~~
~~Serological~~

Sputum smears

→ 2 SS over a period of 2 days after a cough of ≥ 2 wks

Spot → Day 1

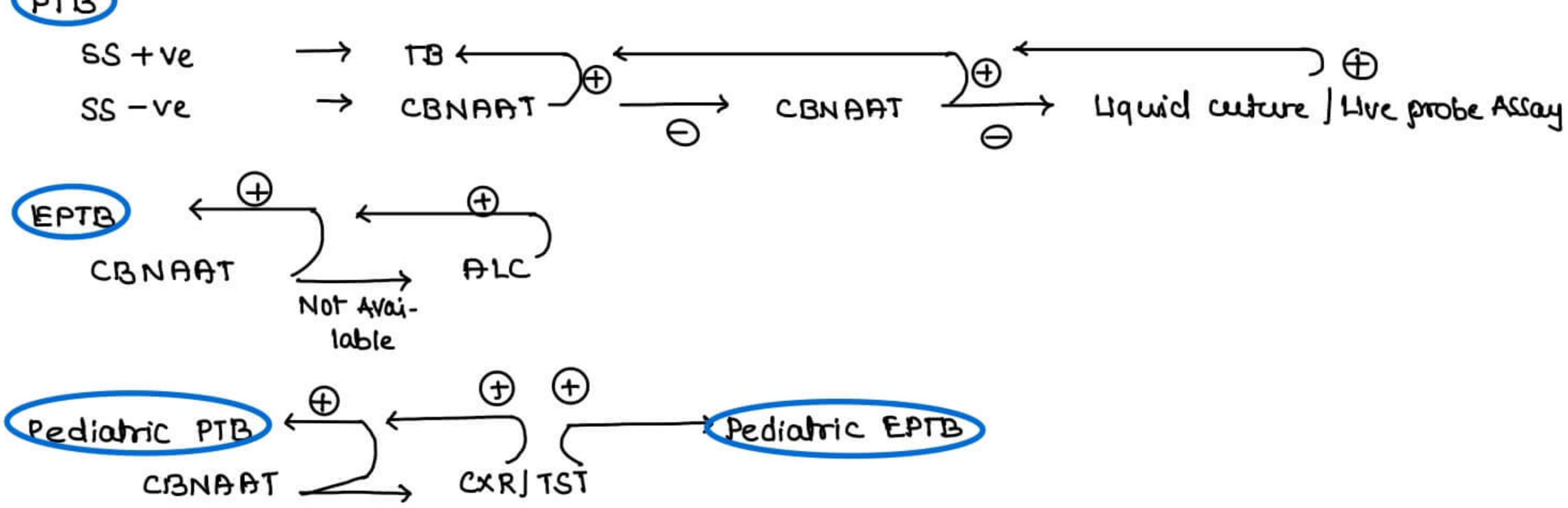
morning → Day 2

→ ZN stain → $0^+/2$ } SS -ive

$1^+/2$ } SS +ive

$2^+/2$ }

Diagnosis of TB



ACTIVE CASE FINDING

→ Door - Door screening

15 Day campaign

→ Active surveillance by

Health Dept worker

ASHAs

TB Supervisors

FDS [Fixed Dose combinations]

1 Reduce pill burden

2 Lower relapses

3 Reductn of resistance

4 ↑ed compliance

5 ↓ Side effects

TREATMENT REGIMES - DAILY [NO extension of Intensive phase]

CAT 1 SS +Ve

SS -Ve

CAT 2. Previously Rx

CAT 4 MDR TB [DOTS + earlier]

CAT 5 XDR TB

RNTCP DOTS TREATMENT

CATEGORY 1 [New SS +ve / New SS -ive]

CATEGORY 2 [Retreatment]

Both categories have same treatment regimen [New 2019-20 guideline]

Regimen → 2 [HRZE] + 4 [HRE] = Total 6 months duration

NON-DOTS REGIMENS

ND1 (seriously ill)	2 (SHE) + 10 (HE)	12m
ND2 (non seriously ill)	12 (HE)	12m

Pregnancy & TB

TB → start ATT immediately irrespective of time of

→ 2 (HRE) + 7 (HR) 9m pregnancy & delivery

MDR TB → DO MTP then start ATT

If no MTP, then start ATT our Kanamycin & Ethionamide Substituted & PAS till Delivery

Weight Bands

ADULTS ④	Pediatric ⑥	MDR ⑤
25 - 39 Kg	4 - 7 Kg	< 16 Kg
40 - 54 Kg	8 - 11 Kg	16 - 25
55 - 69 Kg	12 - 15 Kg	26 - 45
≥ 70 Kg	16 - 24 Kg	46 - 70
	25 - 29 Kg	> 70
	30 - 39 Kg	

NEW DRUGS → DELAMANID

BEDAQUILINE

ICT Based Adherence Support → DOTS - 99

- TB Blister pack has Contact Number Hidden

ICT Based Surveillance Support → NIKSHAY

- All data entered & connected & Central ministry

Incentives

Patients → 500/month

Providers → Cat I - 1000/-

Cat II - 1000/-

Cat IV & V - 5000/-

NPEP [National Polio Eliminat^{n} Programme]

Diagnosis

→ Stool culture & viral isolat^{n}

→ Part of AFP surveillance [Acute flaccid Paralysis] → Acute → <4wks

SMO (surveillance MO) - min - MBBS

↓

House of Suspected case

↓

collects stool sample

↓

Reverse cold chain [+2 → +8°C]

↓

Lab

→ Age group → 0-15yrs

→ 2 stool samples

24-48 hrs

Each ~ 8gm [Adult thumb size)

< 14 days of onset

Reverse cold chain

>60d follow up visit for residual paralysis

<90d diagnosis of Polio to be confirmed

AFP surveillance → Indicators

1. Non polio AFP Rate ≥ 2/1,00,000
2. >80% stool samples collect^{n} done

Pulse polio 1995-96 → Each child 2 drops of OPV to all <5y on same age

Intensified Pulse Polio → House to House survey after PP Day

SWITCH → tOPV (P_1 P_2 P_3) ⟶ bOPV (P_1 P_3)

National SWITCH DAY → 25th April 2016

NHM 2013

NRHM [National Rural Health Mission] [2005-12] ⟶ NHM [2013]

NUHM [National Urban Health Mission] [2005-12]

→ NHM 2013 Includes RCH, NVBDCP, RNTCP, NLEP, IDSP → Comm. Dise. coverage

NPCB, NIDDCP, NPCDS, NMHP, → NCD Coverage

NTCP, NPHCE, NPOH, NPPCF

→ Major Targets

			India
1.	MMR →	< 1/1000 [100/1,00,000]	130
2.	IMR →	< 25/1000	34
3.	TFR →	2.1	2.2

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

→ Components [RMNCH + A Strategy]

RBSK , RKSK, NSSK, JSSK, IMNCI , Immunisation, Diarrhoea control, ARI| Pneumonia, family planning

JSSK [Janani shishu suraksha karyakram]

→ NMBS [National Maternal Benefit Scheme] ⟶ JSY [Janani Suraksha Yojana] [12 April 2005]

↓

JSSK [01 June 2011]

→ Beneficiaries

Maternal component

- Free delivery
- free drugs
- Free Diagnostics
- free Diet [3D – normal vag. delivery] [7D – cessarian delivery]
- Free Transport
- frel Blood Transfusion

New Born component

- free drugs
- free diagnostics
- free blood transfusion
- NB care corner [NBCC]
- NB Stabilizatn unit [NBSU]
- Specialized NB care unit [SNCU]
- Facility based integrated mx of child-hood illness [F-IMNCI]
- Nutritional Rehabilatn centre
- Home Based New Born Care

	NBCC	NBSU	SNCU
MCH level	I	II	III
Locatn	PHC	CHC	DH
Care	NB Care	Sick + LBW	Sick
Staff	1DOC + 1Nurse	1D + 4N	1 Pead + 2-3D + 10-12N
Beds	0	04	12-20
Training	NSSK	F-IMNCI	FBNC

NSSK - Navjath Sishu suraksha karyakram , FBNC – facility Based NB Care

RCH Programme 1997

→ Strategy → RMNCH + A

R	–	Reproductive Health	→	RTI / STI
MN	–	Maternal & NB Health	→	JSSK
CH	–	Child health	→	RBSK
A	–	Adolescence	→	RKSK + NSSK

RBSK [RASHTRIYA BAL SWASTHYA KARYAKRAM]

- → Beneficiary → child [0-18yrs]
  - 0-6yr [Rural + urban slums]
  - 6-18yr [Government schools]
- → 30 Disorders
  - 4D's
    - Diseases
    - Deficiencies
    - Defects
    - Developmental Delays & Disabilites
- → Mobile Health Team → 2 AYUSH MO's, 1 ANM, Pharmacist

RKSK [Rashtriya Kishor Swasthya Karyakram]

- → Beneficiary → Adolescent (10-19 yrs)
- → Components
  - 7 C's
    - Clinic
    - Community
    - Communicatn
    - Content
    - Convergence
    - Coverage
    - Counselling

NRC [Nutritional Rehabilitation centre]

- → Beneficiary → SAM < 5 years aged children
- → Stabilization Phase → 1 - 2 Days [Starter diet]
- → Transition Phase → 2 - 3 Days [catch-up diet]
- → Rehabilitation Phase → Vitamin A, Zinc, Copper MV, Iron, Folic Acid

NSSK [Nayat Shishu Suraksha Karyatram]

- → Beneficiary → Early Neonate
- → Training programme for all levels of HC personnel on NB care & Resuscitation

IMNCI [Integrated Management of NN & childhood Illness]

- → components
  - Diarrhea
  - Measles
  - Malaria
  - Pneumonia
  - PEM
- → Beneficiaries <5yr, <2months, 2m-5yrs of age

Management

Assess

classify the illness

Identify the Rx

Treatment

Counsel the mother

Give follow up care

HBNC [Home Based New Born care]

→ PN visits By ASHA

6 in institutional Deliveries on DAY 3 7 14 21 28 42

7 in Home Deliveries on DAY 1 3 7 14 21 28 42

RCH also covers

Immunizatn

Diarrhoea

ARI / Pneumonia

family planning

NPCBVI , NACB

NPCBVI [National Programme of Control of Blindness & VISUAL IMPAIREMENT]

Blindness → <3/60 in BEBPC

Causes → mc - cataract (62%)

RE (19.7%)

Prevalence → 0.36% (2019-20) [<6/60]

→ If Blind school survey used, then estimatn of total Blindness in India

→ Gross under estimatn

VISION 2020

Main AIM → To eliminates all causes of Avoidable Blindness

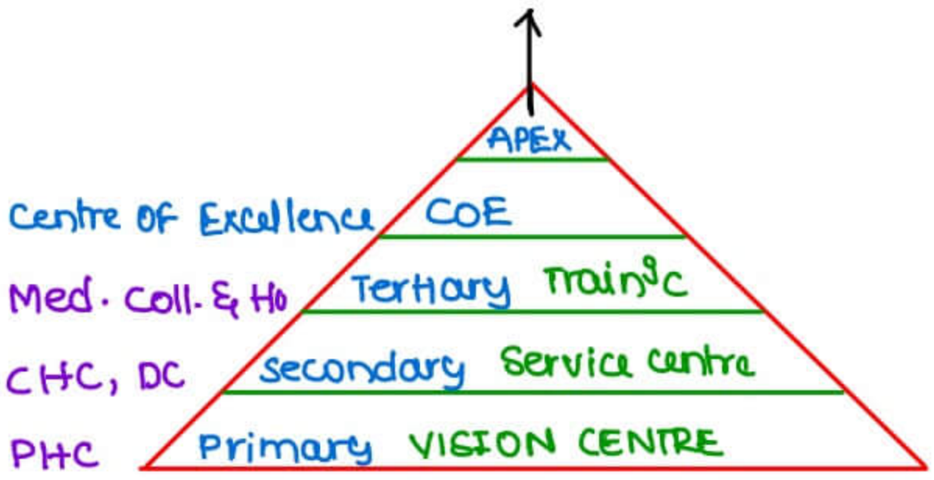
1. Preventable
   - Vit A Def
   - Trachoma
2. Curable
   - cataract

Global

1. Cataract
2. RE + Low vision
3. Childhood blindness
4. Trachoma
5. Oncocerciasis / River Blindness
   [not present in India]
   No vector

INDIA

1. cataract
2. RE + low vision
3. childhood blindness
4. Trachoma
5. Diabetic Retinopathy
6. Glaucoma
7. Childhood blindness



NUMBERS	Populatn Norms
2	1 / 500m
20	1 / 50 m
200	1 / 5 million
2000	1 / 500000
20000	1/50000

Services offered at — By

- Vision centre → vision testing → PMOA [paramedic ophthalmic Assistant]
- Service centre → cataract Sx → Ophthalmologist
- Training centre → Training → Ophthal Department of medical college

School Vision Screening Programme

- → 1 Teacher / 150 students
- → V - VIII (10-14 yrs)
- → Refer to PMOA, PHC [min. pre requisite]
- → VA cut OFF for referral → <6/9

NACP, 1987 [National Aids control Programme]

Background → 1st case 1986 chennai
Launched NACP, 1987 [Phase 1, 1992]
NACP 4th phase (2012-17) → To Accelarate, reverse & integrate response

Objectives → 1. Reduce new infectn by 50%. (2007)
2. Provide comprehensive care to all PLHA [People living w HIV AIDS] & Rx services for all who require

Screening → ERS Battery — 1 out of 3 → before blood Transfusn
ELISA — 2 out of 3 → Symptomatic for HIV
Rapid — ALL3 → Asymptomatic for HIV
Simple

Diagnosis → Western Blot Assay
Based on P24, gp 41
p^{24} Ag test
NA Base test
RT PCR test
QuanHplex br. DNA test

Targeted Interventions → CSW, IDU, Truck Drivers, MSMs [men having Sex w Men], Migrant labourers, Transgenders, Street children, Adolescents

MTCT/ PTCT HIV

→ Rate of MTCT Hiv in India → 30%

→ Rate of mtct Brough Breast feed → 12-16%.

→ Preventⁿ of MTCT

	Efficacy	
1. Zidovidine	> 66%	Best
2. Nevirapine	> 50%	mc used → Single oral Dose
3. Elective CS	> 50%	

Nevirapine Single oral Dose

Mother		New Born
20mg at onset of labour	⊕	Dose - 2mg/kg oral suscpension < 72 hr

- Post NVP Prophylaxis MTCT Rate will become → 30% to 15%.

4. Current modality of choice → TRIPLE ARV PROPHYLAXIS [>90% Efficacy]

- Tenofovir
  Lamivudin
  Efavirenz — NNRTI / Efavirenz earlier in life → Lopinavir / Ritonavir Susbstitutn
- Started from 14 wks POG
  Pregnancy
  Labour delivery + NVP Prophylaxis to New Born 0-6 wks age
  Breast feeding
  till 1 wk post BF Stoppage

→ Testing of HIV [ICTC centre]

1. OPT - IN → Testing offered to patient to give Consent
2. OPT - out → Patient informed that testing is routinely done & consent assumed unless patient declines [India]

→ ART Initratⁿ → irrespective of CD4 Count

NVBDCP, NLEP

NVBDCP [National vector Borne Disease Control Programme, 2003-04]

→ MC VBD → Malaria
MC Viral VBD → Dengue
MC arboviral VBD → Dengue

→
1 Malaria
2 filariasis
3 Dengue
4 Kala Azar
5 JE
6 CGF

Diagnosis → PBS [JSB, Jaswant Singh Battacharya stain]
→ Dip stick test [Rapid Diagnostic kit test] based on Pf histidine Rich protein Type 2
→ 1 microscopy / 25000 POP
→ Optimal Test

ITBN → Insecticide & Bed Nets
→ Shelf life - 6months
→ 2.5% Deltamethrin [25 mg/m²]
5% cyfluthrin [50 mg/m²]

LLIN → long lasting Insecticide & Bed nets
→ Shelf life - 3yrs
→ Use chemical binder

Treatment [2013]

CASES

P_{vivax} P_{ovale} → Chloroquine + Primaquine

$P_{fal.}$ $P_{malariae}$ → ACT + Primaquine

Other parts of India	North East India
ACT - SP + PQ	ACT - LM + PQ
A = Artesunate	A = Artemether
S = Sulfodoxine	Lm = Lumefantrine
P = Pyrimethamine	

→ Pregnant cases
1. PQ withdrawn
2. 1st Trimester
Quinine > ACT

Chemoprophylaxis

Short term [≤ 6wks] → Doxycycline [1 days before 4 wks after return]
Long term [> 6wks] → Mefloquine [2 wks before & 4 wks after return]

Malariometric measures

OLD

→ Spleen Rate → Endemicity
→ Infant parasite rate → Recent transmission

NEW

→ Annual Parasitic incidence [API] → Best indicator of malaria control
→ Annual Blood Examinath Rates → Best indicator of Operational effciency
→ Slide positivity Rate
→ Slide falciparum Rate

KALA AZAR

TReatment

1. LAMB → 10 mg/kg |B. wt — Liposomal Amphitericin B
2. MILTEFOSIN + PARAMOMYCIN
3. Amphotericin B emulsion
4. Miltefosin capsule
5. Amphotericin B Deoxy cholate
6. Amphotericin B emulsion inject^{n}

NLEP [National leprosy Eliminat^{n} Programme]

MULTIDRUG THERAPY

	PBL [Pauci Bacillary]	MBL [Multi Bacillary]
No. of skin lesions	→ ≤5	→ >5
Nerve Involvement	→ 0-1	→ ≥1N mc - Ulnar nerve Test at medial condyle Check for cord thickners
RJC	→ TT BT	→ BB BL LL
No of Drugs	→ 2 Dapsone Rifampicin	→ 3 Dapsone Rifampicin Clofazemine [C_2]
Duration of Rf	→ 6 m	→ 12m
Duration of follow up	→ 2yrs	→ 5yrs

→ MDT completed, no change in lesions → Stop MDT
Reassure
[Bacteriological recovery do not coincide ε clinical Recovery]

→ OBMS [once A Month Supervised Therapy]

→ Accompanied MDT
- Any responsible person can collect MDT therapy on behalf of patient

→ Uniform MDD
- Dapsone + Rifampicin + Clofazamine to all

→ SET centre → survey Educat^{n} & Rf centre

→ SIS → simplified Informat^{n} System

National Iodine Deficiency Disorder control Programme [NIDDCP], 1992

National Goiter control Programme, 1962 ⟶ NIDDCP, 1992

Impact Indicators → Major → UIE [urinary Iodine Excret^{n}] levels
- generally measured in pregnant ♀
- over 24hrs

Others → Neonatal hypothyroidism
Goitre

Level of Salt Iodinisat^{n} → 30 ppm at production level
15 ppm at consumer level

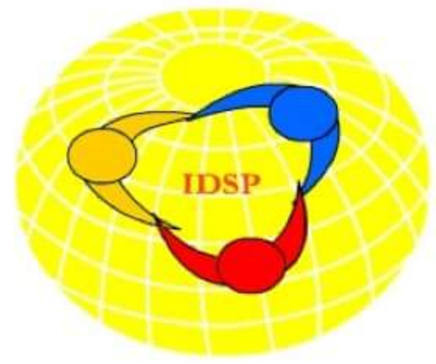
Food-in-one Salt → 40µg Iodine + 1mg Iron / gm of Salt

Criteria to track elimination →
1. Enlarged thyroid (6-12y) → < 5%
2. UIE < 100 µg/L → < 50%
3. UIE < 50 µg/L → < 20%
4. Households c iodised salt → > 90%

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

→ Encompasses

Regular surveillance	Sentinel surveillance	Periodic Surveillance
VBD (malaria)	HIV	NCD Risk factors &
WBD (Typhoid, cholera)	HPV	Anthropometry
RD (TB)	HCV	BP
VPD (Measles)	Water quality	Tobacco & Nutritional Status
Polio	Air quality	Blindness
RTAs		
YF, Plague		
Meningitis		
Haem. Fever		
Resp. Distress		



→ Forms under IDSP
- S form → Suspected cases → by Health workers → Syndromic Dx
- P form → Presumptive cases → Doctor/med. officer → Presumptive Dx
- L form → Lab confirmed cases → Lab Staff → Confirmed Dx

NEW PROGRAMS

1. AYUSHMAN BHARAT SCHEME [ABS]

A. HEALTH & WELLNESS CENTRES [HWC]

→ 1.5 Lac HWC centres
→ comprehensive health care [including MCH, NCDs]
→ Free essential drugs & diagnostic services

B. NATIONAL HEALTH PROTECTION SCHEME [AB-NHPS] / PRADHAN MANTRI JAN AAROGYA YOJANA [PMJAY]

→ Target → 10.74 crore families, Total 50 crore people]
→ Apex level → chaired by Union Health & family Welfare Minister
→ Defined Benefit Cover
  → Rs 5 Lakh / family / year ; No cap on family size & age
  → Secondary & Tertiary care hospitalization
  → cashless & paperless Scheme
  → Public hospitals & empanelled private hospitals
  → include 1,354 packages [including Bypass, Stenting, Knee replacements]
→ Hospital Eligibility
  → All public hospitals
  → Empaneled private health care facilities
  → Empanelment criteria → Hospitals c > 10 beds

2. ANEMIA MUKT BHARAT [AMB] / INTENSIFIED IRON PLUS INITIATIVE

→ MAIN AIM → to reduce prevalence of anemia by 3% points per year among children, adolescents and women in the reproductive age group [15 - 49 yrs], blw the year 2018 - 22

→ ANEMIA MUKT BHARAT 6x6x6 strategy
- → 6 Beneficiaries
- → 6 Mechanisms
- → 6 Interventions

→ PROPHYLACTIC DOSE & REGIME FOR IRON FOLIC ACID SUPPLEMENTATION

AGE GROUP	ELEMENTAL IRON [mg]	FOLIC ACID [µg]	Frequency	Remark
6-59 months children	20	100	Biweekly	Bottle [50ml]
5-9 years children	45	400	Weekly	Pink color tablet
10-19 years Adolescents	60	500	Weekly	Blue color tablet
20-49 years Women [NPNL]	60	500	Weekly	Red color tablet
Pregnant, Lactating mothers	60	500	Daily	Red color tablet

3. SWACHH BHARAT MISSION [SBM] 2014 / SWACHH BHARAT ABHIYAN

→ AIM : To eradicate / end Open - defecation in India by 2019 by construction of 12 million toilets

→ SWACHH BHARAT MISSION - GRAMIN [SBM - G]
- → construction of toilets in Government Schools [Ministry of Human Resource & Development]
- → Rural school sanitation → Separate Boys / Girls toilets [Dept. of School Education]
- → construction of toilets in Anganwadi centers [Ministry of Women & child development]

→ SWACHH BHARAT MISSION - URBAN [SBM - U]
- → Household toilets [and conversion of insanitary latrines to pour-Flush latrines, community toilets, public toilets, Solid waste management, IEC & public awareness, capacity building
- → implementation by → Ministry of urban development

4. NATIONAL NUTRITION MISSION [NNM] 2017-18 / POSHAN ABHIYAN

→ NNM VISION → To ensure attainment of malnutrition - free india by 2022

→ NNM TARGETS
- → to reduce stunting, under nutrition, anemia [among young children, women & adolescent girls] & reduce Low birth Weight by 2%, 2%, 3% and 2% per anum respectively
- → achieve reduction in stunting from 38.4% [NFHS-4] to 25% by 2022 [mission 25 by 2022]

Integrated Child Development Services (ICDS) 1975 [Rural areas & urban slums]

Heart of ICDS → Anganwadi

Population norms → 1 AW/ 400-800 in plains
1 AW/ 300-800 in hills

Beneficiaries → 1. children [0-6yrs]
2. Pregnant & lactating ♀
3. Non pregnant non lactating Reproductive age 15-49 y ♀
4. Adolescent Girls (11-18yrs)

Services → ~~OPD/IPD~~
Health Educatn
Immunizatn
Family planning & Contraceptive
Referral services
Non formal Pre school educatn
Health check ups
free food supplementations

FREE FOOD SUPPLEMENTATn →	calories (1/3)	Proteins (1/2)	
	500 K.cal	12-15 gms	6-72 m children
	800 K.cal	20-25 gms	Malnourished children
	600 K.cal	18-20 gms	Preg & lactating mothers

Administratn

ministry → Ministry of women & child development

Unit → Community development Block
ICD Block = 100 villages = 1 lakh pop → CDPO

HEALTH SCHEMS

Mid Day Meal Programme / Mid Day Meal Scheme

	(1/3) calories	Proteins (1/2)	cereals
Primary →	450 K.cal	12gm	100g
Upper Primary →	700 K.cal	20 gm	150g

Ministry → Human Resource & Development

National Programme for Preventn & control of Diabetes, CV diseases & Stroke (NPCDCS)

→ launched in 100 districts & 21 states

Sub centre → Health promotn
Opportunistic Screening for BP & Sugar
Referral to CHC for DM, HTN

CHC → Diagnosis & Management at NCD clinics
Home visits for bed ridden patients
Referral to DH if complicated cases

DH → Health promotion
Screening for >30yrs
Dx & Mx of CV diseases
Palliative care for chronic debilitating progressive patients

Urban Health → Screening of urban slum populatn
Check up Scheme Screening for populatn >30yr pregnant ♀
cancer control → RCC, OWDS

Health Policies & Legislations

PMSSY 2006 [Pradan mantri 'Swasta suraksha yojana]

→ correctn in imbalances in availability of affordable Health care in country
→ components
1. Opening up of AIIMS like institutn across country
2. Upgradatn of Medical colleges & institutn in India

Pradhan Mantri Jan Dhan Yojana [PJDY]

→ National mission for financial inclusion
→ launched on 15th August 2014

MTP ACT 1971

Indications → Humanitarian
Eugenic
Therapeutic
Social

Education Qualificatn → MD Gynobs
Diploma Gynobs
MBBS + 6m JRship in Department of Gynobs

Experience → ≥ 25 MTP's
Timing → 0 - 20 wks → 0-12 wks [low risk.] — 1 Doctor Opinion
→ 12-20 wks [High risk] — 2 Doctor opinion

Organ Transplantatn Act, 1994

→ Any person ≥ 18yrs can authourise
→ Only for therapeutic purpose
→ 2011 onwards 10 yrs imprisonment + 20 lakh - 1 crore fine

National Rural Employment Guarantee Act 2005

→ > 100 days of employment / year
→ Job card Given
→ < 15 days → employment
→ < 5km Radius of house
→ unskilled mannual labour work
→ Standard wages
→ BPL Families

INTRODUCTION

→ BIOMEDICAL WASTE MANAGEMENT in India covered by EPA [Environment Protect^{n} Act 1986]
- Sect^{n} 6, 8, 25

→ **4 SCHEDULES**

SCHEDULE I	→	categorization, Segregation, Processing, Treatment, Disposal
SCHEDULE II	→	Standards for treatment & Disposal
SCHEDULE III	→	Authorities & Duties
SCHEDULE IV	→	Labels for BMW bags, containers

→ Under Ministry of Environment & forests

LATEST GUIDELINES 2017-2018

→ earlier → BMW Mx 1998
- 10 categories, 4 colorcoded bags & disposal

→ 2017-18 → – Discarded 4 categories & disposal

→ YELLOW CATEGORY

① – Human anatomical waste → Placenta, Appendix, Gall bladder, Amputations → INCINERATION/ PLASMA PYROLYSIS (2006)/ DEEP BURIAL

② – Animal waste → Animal House

⑥ – Soiled waste [cotton/cloth] → Gauge pieces, Bandages, Dressings, Swabs

⑩ – chemical waste → Disinfectants, product^{n} of Biologicals → INCINERATION / PLASMA PYROLYSIS/ ENCAPSULATION

⑤ – Discarded medicines → Expired medicines, cytotoxic Drugs

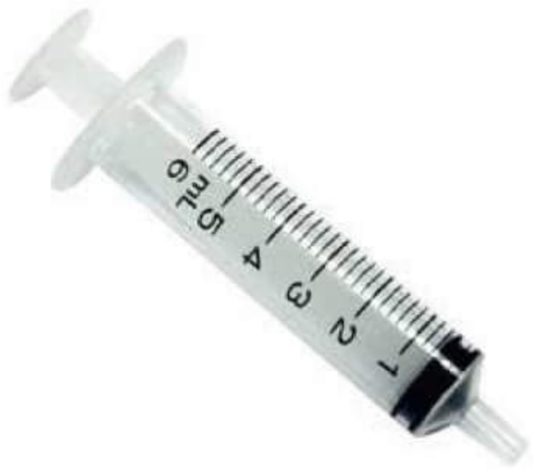
⑧ – Liquid chemical waste [cleaning, House keeping, disinfect^{n} activities] → Chemical R$_{t}$ $\xrightarrow{F/b}$ Drain

③ – Microbiological, Biotechnological, lab waste [cultures, live vaccines, toxins, other Biological] → Non chlorinated chemical R$_{t}$ $\xrightarrow{F/b}$ incineration

→ Bed Linen, mattresses, Bedding

→ RED CATEGORY

⑦ – Solid / contaminated [Recyclable] waste
[plastic / Rubber] Tubings → AUTOCLAVING / MICROWAVING / HYDROCLAVING
catheters
canules



↓
DESTRUCTⁿ / SHREDDING
↓
ENERGY RECOVERY / FUEL OIL / ROAD MAKING

→ WHITE CATEGORY

4 → Wasted Sharps → AUTOCLAVING / DRY HEAT
Needle, Sx blades, Scalpels
↓ F/b
SHREDDING / MUTILATⁿ / ENCAPSULATⁿ
↓ F/b
FOUNDRIES / LAND FILS / SHARPS PITS

→ BLUE CATEGORY

– Glassware
Metallic Body Implants → Orthopedics
→ ENT
→ Dental
→ Cardio thoracic vascular Sx
→ CHEMICAL R/ / AUTOCLAVING / HYDROCLAVING / MICROWAVING
F/b → Re-cycling

METHODS

Incineration

→ temperature → >1200°C
→ principle → High temperature + Dry oxidatⁿ
→ combustible matter > 60%.
Non-combustible solids < 05%.
Non-combustible fines < 20%
Moisture content < 30%.
→ contraindicated are
1. PVC Plastic Waste → Angiosarcoma of Liver
2. Pressurised waste → Explosⁿ can occur
3. Heavy metal waste → Lead, cadmium, mercury → poisoning
4. Reactive chemical waste → Silver [X Rays]
5. Radio active waste → Sea burial is recommended

AUTOCLAVING

→ Temperature in India → 121°C 60 min 15 psi
135°C
145°C

→ Principle → steam under high pressure
→ Check sufficiency of autoclaving → GBS [Geo Bacillus Stearo thermophilus]

HYDRO CLAVING

→ Temperature → 121°C or 132°C
→ principle → steam under pressure
→ Check sufficency → Bacillus subtilis

MICRO WAVING

→ 12 nm, 2450 MHz
→ principle → Generat^{n} of CONVECTION CURRENT in heated water molecules
→ Check sufficiency → Bacillus atrophaeus

ENCAPSULATION

→ Filling containers ↑ BMW & immobilizat^{n} materials [foam, sand, cement, clay]
↓
Seal the containers

PLASMA PYROLYSIS → > 1200°C

INERTIZATION

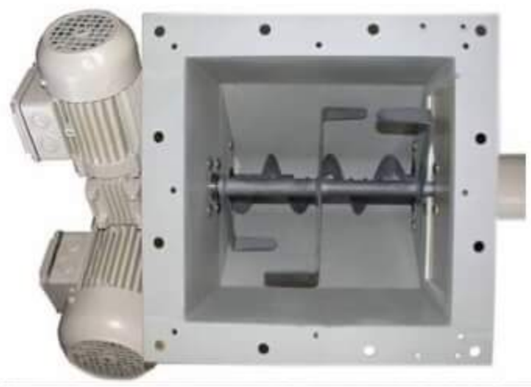
→ large volumes of toxic BMW
↓
NON TOXIC WASTE [Inert]

→ 15% Cement + 15% Lime

SCREWFEED TECHNOLOGY

→ BMW mixed ↑ cement
↓
Rotating Auger [Heating & Shredding]

→ Non Burn, dry thermal process
→ ↓ weight by 20-25%
↓ volume by 80%
→ used for sharps waste, infectious waste
→ CI for Radiological, cytological, pathological waste



Rotating Auger

DRY Heat → > 185°C

COMPOSTING → Land + cow dung [GOBAR]

Vermi - composting

→ Earth worms [Eisinea foetida] + Land + mature COWDUNG [KHAD] + Coconut Husk

SPECIFIC WASTE DISPOSAL

HIV Infected Material Disposal

→ Rx 1% hypochlorite

↓

categorize

↓

Disposal

Mercury Disposal

→ Recollect → Recycle → Reuse [R³]

e-waste Disposal → Recycle

Blood spill → 1% hypochlorite [neutralizer] → Drain

TB SPUTUM → Incineration, Burning, Autoclaving, Boiling, 5% cresol

DISASTER MANAGEMENT

Definitions

Disaster → An occurance that causes damage or ecological disrupt^{n} or the loss of human life or deteriorat^{n} OF health or health services ON A SCALE sufficient to warrant an extra ordinary response from outside of that community or area.

→ COLIN GRANT

Any occurence or catastrophy causing injury and/or illness simultaneously to ≥ 30 persons who require hospital emergency services

Disaster Mitigat^{n}

→ Prevent^{n} OF convers^{n} of hazard/risk into disaster situat^{n} [to minimize the damage]

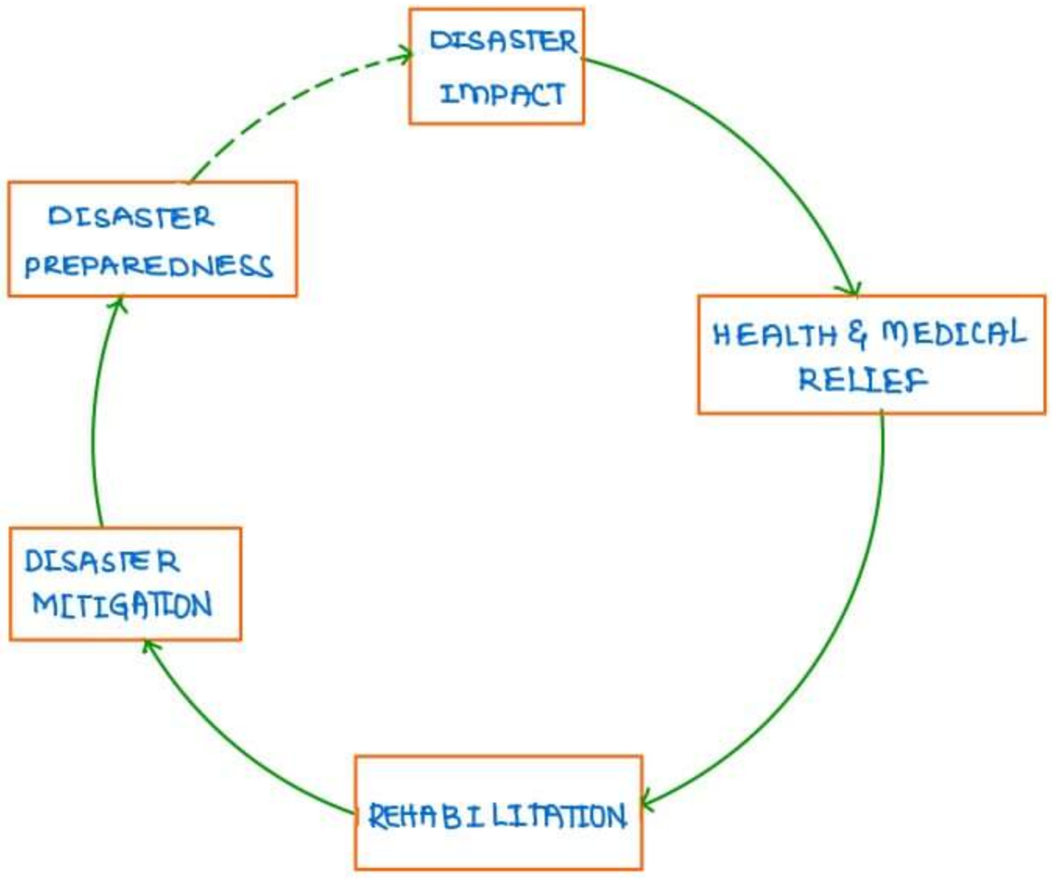
Surge capacity

→ ability of a health system to respond to disaster situations

TYPES OF DISASTERS

NATURAL		MANUAL
Geological	– Earthquakes, volcanos	Wars
Hydrological	– Floods, Tsunamis	Accidents
Climatological	– Droughts, fires	
Biological	– Epidemics	
Extraterrestrial	– Meteorites	

DISASTER CYCLE



Health & Medical Relief

1. Primary phase [0-6 hrs] → First aid, medical care
2. Secondary follow up [6-24 hrs] → Transportatⁿ, Sanitatⁿ, Immunizatⁿ
3. Tertiary clean up [1-60 days] → food, clothing, Shelter, Employment, Social services, Rehabilitatⁿ

TRIAGE

- → classificatⁿ of victims of disasters
- → On basis of likelihood of survival
- → done at the site of disaster
- → Categories

Priority			
Highest	→	Immediate Resuscitatⁿ or Limb/ Life saving Sx 0-6hrs	RED
High	→	possible Resuscitatⁿ or Limb/ life saving Sx 6-24 hrs	YELLOW/BLUE
Low	→	Minor injuries [non life threatening], Ambulatory	GREEN
Least	→	Dead & moribund [about to die]	BLACK

- → colour coding → TAGGING
- → Types of Triage

START → Simple triage And Rapid Treatment
→ In remote inaccessible areas of country, done by LAY PERSONS

REVERSE TRIAGE → minor injuries must be given highest priority
→ 9th wars, Battles

PDP [Post Disaster Phase]

→ mc disease reported is Acute Gastro-enteritis
→ Not seen in PDP ?
Typhoid Scabies Leishmaniasis URI
cholera TB Leptospirosis
→ mc vitamin deficiency → Vitamin A [B_3, C]
→ vaccines in PDP → All C/I except Measles
Q which WHO vaccines are C/I in PDP
→ esply Typhoid, cholera, Tetanus toxoid [all others are relatively C/I]
Q Which vaccine is mandatory for medical persons
→ Typhoid, cholera, Tetanus toxoid
→ most important preliminary step in PDP → Chlorinat^n
- residual Cl_2 in drinking water → ≥ 0.7 mg/L [ppm]

DM in INDIA

→ National Disaster Management Authority [NDMA]
- chair person → Prime ministry
→ Nodal ministry → Home Affairs
→ Nodal centre → District
→ National Institute of Disaster management [NIDM]
- under Home Affairs
- under union Home minister

National Disaster Response force
- includes CRPF, BSF, ITBP, CISF

→ maximum mortality is reported from Hydrological Disasters
Worst man made disaster → Bhopal Gas Tragedy, 3rd Dec 1984
- methyl isocyanide exposure
→ world disaster RISK reduct^n Day → 13th October

OCCUPATIONAL DISEASES

I. Physical Agents

- Heat → Hyperpyrexia, Exhaustion, Stroke
- Cold → Chill Blains, frost Bite
- Light → cataract, Miner's nystagmus
- Pressure → Caisson's Disease
- Noise → Deafness
- Radiat^{n} → Leukemias, Aplastic anemias
- Others → Burns, injuries, Accidents

II Chemical Agents

- Gases → Poisonings
- Dusts → Pneumoconioses
- Metals → Heavy metal poisonings
- Chemicals → Poisonings [Solvents]

III Biological Agents

- Brucellosis
- Anthrax
- leptospirosis

IV Occupational Dermatitis → mainly in metal type of exposure

V. Occupational cancers

VI Others → Neurosis, Hypertension

PNEUMOCONIOSES

→ d/t occupational exposure to dust

→ < 0.5 μ → always in Brownian motion [moves in & out]

0.5 – 3 μ → most dangerous partical size

3 – 5 μ → Trapped by mid respiratory tract

5 – 10 μ → Trapped by upper resp. tract

> 10 μ → fall on machine

→ common Pneumoconioses

	d/t	MC Disease Associat^{n}	MC occupational associat^{n}
Silicosis	Silica Dust	TB	cement, Glass, Bauxite miners Industry
Anthracosis	Coal Dust	Progressive Massive fibrosis	Coal miners Industry
Asbestosis	Asbestos Dust	Mesothelioma, Lung cancer	
Byssinosis	cotton fiber dust		Textile Industry
Bagassosis	BAGASSE		Sugar Mill

	dlt	mc associated organism
Farmer's lung	mouldy Hay	micropolyspora faeni
Compost lung	Compost	Aspergillus
Bird Fancier lung	Bird droppings	
Siderosis	Iron	
Stannosis	Tin	

→ mc micro organism associated ī Bagassosis → Thermoactinomyces Sacchri

→ mc , mc cause of Death , Mc cause of Disability → SILICOSIS

→ Notifiable Diseases under factory Act' 1948

1. Silicosis
2. Anthracosis
3. Asbestosis
4. Byssinosis

→ Snow storm appearance on CXR → Silicosis

→ Byssinosis → mc seen in SPINNERS

→ for Bagasossis control in Sugar mill → 2% Proprionic Acid Spray is used

LEAD POISONING / PLUMBISM / PAINTER'S COLIC

→ mc source in India → Petrol / Gasoline / vehicular exhaust

mc mode in India → Inhalatn

→ Cf

- Bartonian Line → Blue line on gums [lead Sulphide PbS]
- Pallor → 1st sign , most consistent sign
- Wrist / foot Drop → Nerve palsy
- Colic
- Encephalopathy

} dlt inorganic lead exposure

→ dlt organic lead exposure

→ Screening Test → CPU [Copro Porphyrin in Urine]

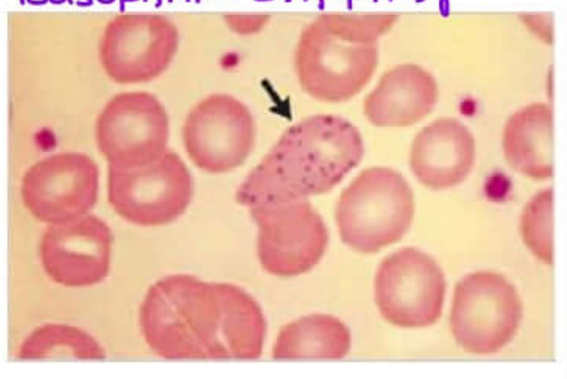
→ Cut off > 150 µcg/L

		cut offs
→ Diagnostic Test	→ ALAU [Amino levulinic Acid in Urine]	→ > 5 mg/L
	Lead levels in Blood	→ > 70 µcg/100m
	Lead levels in Urine	→ 70.8 mg/L

→ mainly RBC's Affected

RBC's → Basophilic Stippling
RBC's → Microcytic hypochromasia

Basophilic Stippling



→ RyOC → 1. EDTA
2. Penicillamine

→ Prognostic Test → PBS [Peripheral Blood Smear]

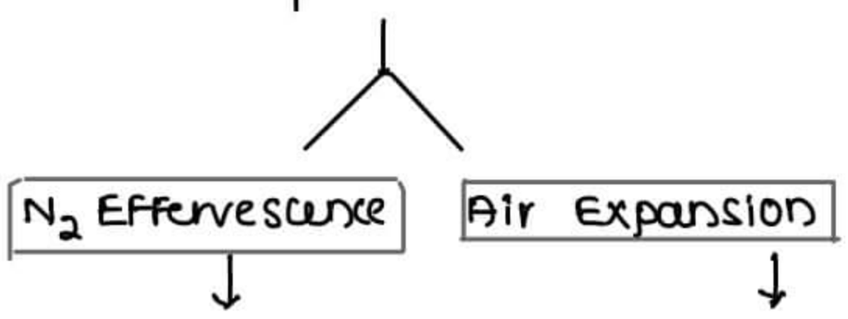
OCCUPATIONAL CANCERS

→ mc occupational cancer → Skin [Squamous cell carcinoma]

→ PVC [Poly Vinyl Chloride] Exposure → Angiosarcoma Liver
Asbestos → Mesothelioma
Benzene → Leukemia
Benzidine } → Bladder cancer [Transitional cell carcinoma]
N_2 / Aniline
Nickel, chromium, wood dust → Nasal sinus carcinoma
RADON } → Lung carcinoma
Silica

CAISSON'S DISEASE / DECOMPRESSION SICKNESS

→ Affects deep sea drivers
→ dlt Low pressure



N_2 Effervescence	Air Expansion
Bends	Barotitis
Chokes	Barosinusitis
Prickles	Barodontalgia
Paralysis [most severe]	Emphysema [most severe]
Aseptic Bone Necrosis	Abdominal distention

→ RyOC → 1. Recompression chambers
2. Hyperbaric O_2 therapy

ERGONOMICS

→ Science where we study people's efficiency in their working environment.
→ Pre Placement Examination
— Right man in Right Job
Fitting Job to Work

Post Placement Examinat^n
— Regular periodic Examinat^n
Annual → most occupat^n. Exposures
Every 2m → Radiat^n exposure
monthly → Lead, Dye, Radium "
Daily → Dichromates

SICKNESS ABSENTISM

1. Medical causes
2. Non sickness causes → Economic, Social, others

→ 8-10 days / person / year

OCCUPATIONAL HEALTH LEGISLATIONS

THE FACTORY ACT 1948

→ FACTORY → ≥ 10 persons working together ī power or
≥ 20 persons working together ī out power

→ Not applicable on → Defence, Mines, Railways, Eateries / food joints

→ Child → 0-14 yrs [Employment prohibited <14 yrs]
→ Adolescent → 15-18 yrs
→ Work Hour Duration → 9 hrs / Day
48 hrs / week
60 hrs / week [overtime]

→ 1 safety officer / 1000 workers
1 welfare officer / 500 workers
1 canteen / 250 workers
1 creche / 30 female workers

→ 29 Notifiable Diseases
→ Per capita space > 500 cu. ft.

The ESI ACT 1940

→ ESI → Employees state Insurance
→ ministry → union ministry of labour
chair person → union minister of labour

→ Contribution → Employer → 3.25% of wages
Employee → 0.75% of wages

→ Centre : State → 7:1

→ Coverage

- All Non Seasonal factories where ≥ 10 persons
  All other factories where ≥ 20 persons

- Income < 21,000/- per month

→ Not applicable on
- Defence
- Mines
- Railways

→ Benefits

1.	Medical Benefit	→ Full medical care
2.	Sickness Benefit	→ 70% wages × 91 days
	Extended sickness benefit	→ 80% wages × 2 years
	Enhanced sickness benefit	→ 100% wages × 7 Days [Vasectomy]
		× 14 Days [Tubectomy]
3.	Temporary Disablement Benefit	→ 90% wages till recovery
	Permanent Disablement Benefit	→ 90% wages [worked by Medical Board]
4.	Maternity Benefit	→ 100% wages × 26 weeks
5.	Dependence Benefit	→ 90% wages as pension
6.	Funeral Expenses	→ Upto Rs 15,000

GENETICS & HEALTH

GENE → A sequence of DNA/RNA which codes for a molecule ∴ a particular funct^n

GENOME → Sum total of genetic informat^n of an individual, encoded in the structure of DNA

GENOMICS → the study of human gene

GENE THERAPY → Introduct^n of a gene sequence into a cell so as to modify its behavior

DNA TECH → Development of new Dx technique based on DNA Eg. Restrict^n enzymes

EUTHENICS

Environmental manipulat^n for full expression of genes

Eg. Diabled friendly schools

EUGENICS

Genetic manipulat^n for full expression of genes

Positive	Negative
IVF	Abort^n
Genecloning	Sterilizat^n
Egg transplant	family planning

GENETIC COUNSELLING

PROSPECTIVE

→ Done to identify heterozygotes thr-ough screening & then advise them

→ Eg

- Thalassemia
- Sickle cell anemia

RETROSPECTIVE

→ Seeking advice when a herditory disorder has already occured in the family

→ Eg.

- congenital anomoly
- Mental Retardat^n
- Metabolism Errors

HUMAN GENOME PROJECT

→ By Dr JAMES D WATSON (1990)

→ Total no. of genes in human genome → 19000 – 20000 [~ 19,500]

HARDY WEINBERG LAW OF GENETICS

→ Law of popul^n Genetics

→ $(a+b)^2 = a^2 + b^2 + 2ac$

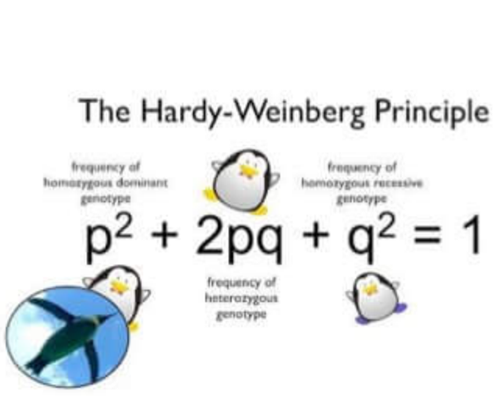
→ Frequency of genes remain constant from one generat^n to another generat^n

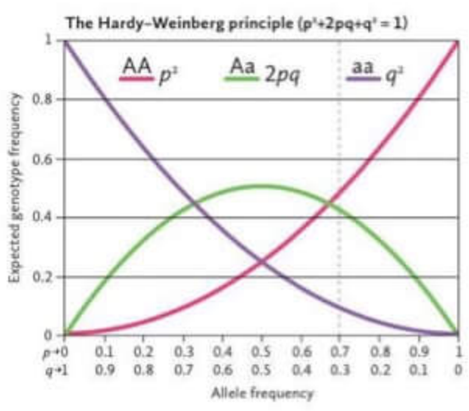
→ **Applicable on**

- large popul^n
- Static popul^n
- Random mating popul^n

Not Applicable on

- Small populat^ns
- Dynamic populations
- Non Random mating popul^n
- Assortative mating popul^n
- Mutation
- Gene Flow
- Gene Drift
- Natural selection
- Migrat^n





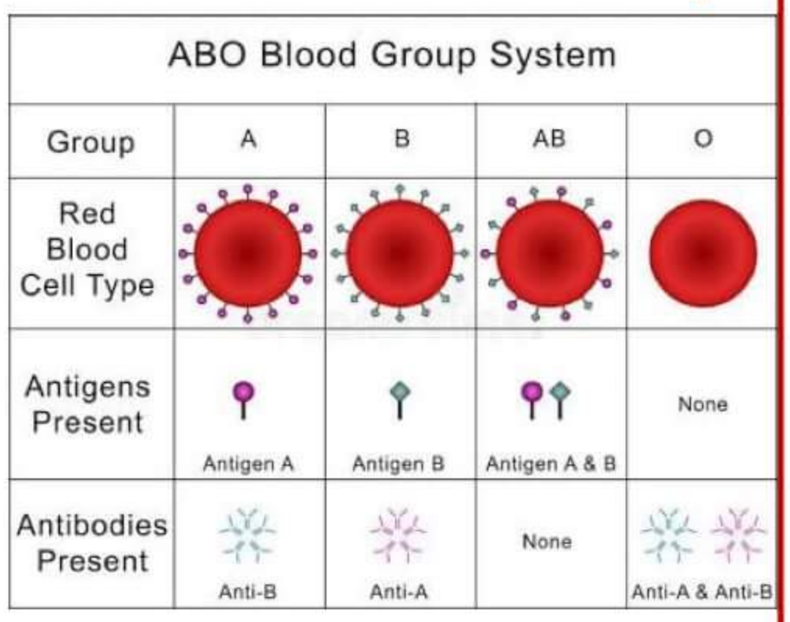
BLOOD GROUPS IN INDIA

ABO

→ O 40%
B 33%
A 22%
AB 05%

RH

Rh^+ 94%
Rh^- 06%



BOMBAY BLOOD GROUP

→ cannot express ABO dlt absence of H antigen
→ cannot recieve blood except Bombay blood group
→ 4 persons | million populatn
→ aka HH Blood group

AMNIOCENTECIS INDICATIONS

1. Age of women >35 yrs
2. H/O DOWN's syndrome
   chromosomal defects
   metabolic defects
3. Sex determinatn is warranted

MENTAL HEALTH

Intelligence Quotient (IQ)

→ score derived from standardised tests
→ STERN'S IQ Test

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$$

= IQ Points
→ useful till 15yrs

Q 15 yrs old child has mental age 5 yrs, IQ → ?

$$IQ = \frac{5}{15} \times 100 \rightarrow 33 \rightarrow \text{Imbecile}$$

IQ classification

Idiot	→	0-24
Imbecile	→	25-49
Moron	→	50-69
Borderline	→	70-79
Low normal	→	80-89
Normal IQ	→	90-109
Superior	→	110-119
very Superior	→	120-139
Near Genius	→	≥ 140

Mental Retardatn classificatn

Normal IQ	≥ 70	
Mild MR	50-69	→ 70% [Mc]
Moderate MR	35-49	→ 20-30%
Severe MR	21-39	
Profound MR	≤ 20	

MCC MR in India → Down's Syndrome

NATIONAL MENTAL HEALTH PROGRAMME 1982

AIMS

1. Preventn & Rx of MH Disorders
2. Use of MH technology to improve health
3. Applicatn of mental health principles in development & to improve Quality of life

OBJECTIVES

1. Availability & accessibility for ALL
2. Applicatn of MH Knowledge in general H. care
3. To promote Community participatn in MH

LEGISLATION

The mental Health Act 1987 → The MH care Act 2011

Mental Health Disorders in India

→ mc MH Disorder → Unipolar depression
Alcohol disorders
Schizophrenia
Bipolar disorders

→ mcc Deaths among MH Disorders → Alzelhmer's & other dementias
→ DALY's lost d/t U. depression → 64,963 [1400 DALY's lost / 1,00,000 population]
→ Mc substance abused → Tobacco
Mc Narcotic substance abused → Cannabis
→ mental morbidity → 18-20/1000 populatn


Cannabis

SUICIDES in India

→ Rate → 10.3 / 100000 populatn
→ Mc mode → Hanging

DEFINITIONS

HEALTH PLANNING → orderly process of defining community health problems, identifying unmet needs, surveying the resources to meet them, establishing realistic feasible priority goals, projecting administrative actn to accomplish the programme

Resources → stock or supply of man power, money, materials, skills, knowledge, techniques & time that can be drawn by a person or organisatn in order to functn effectively

OBJECTIVES → Precise, specific PRE-PLANNED end point of all activites in a health program

90/90 → >90% case detectn Rate
> 90% cure rate

TARGET → Degree of achievement of objectives with a time line

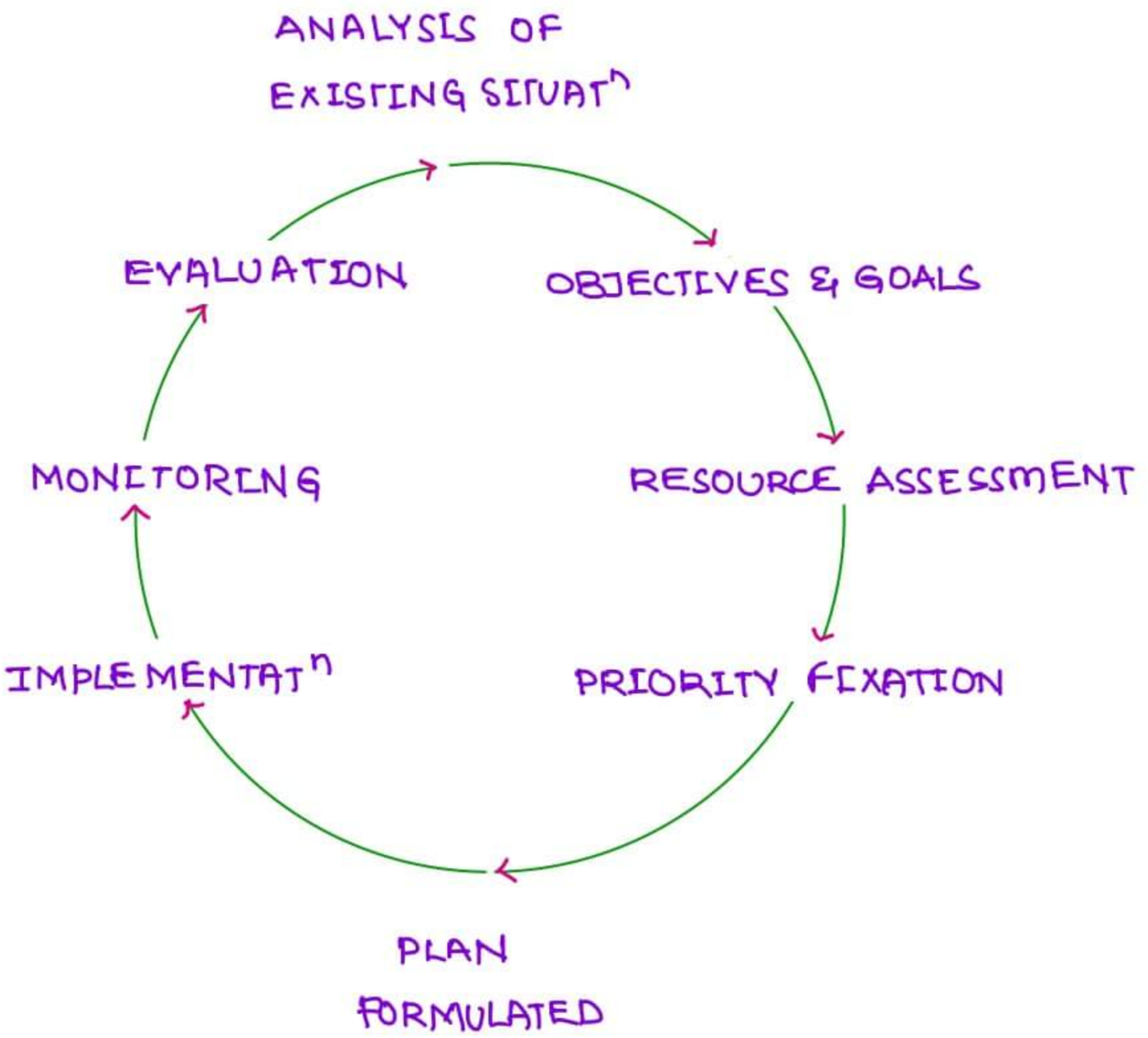
GOAL → Ultimate desired state in a H. programme towards which objectives & resources are directed

CONTROL OF TB

All or None phenomenon

Not constrained by time & resources

PLANNING CYCLE - AORP – PRIME [mnemonic]



HEALTH PLANNING COMMITIES

BHORE COMMITTE [1946] / H. Survey & Development committe

1. Short term plan → 1 PHC / 40,000 populatn
2. Long term plan → PHC 75 bedded
   [3 million plan] Sec. Health unit 650 bedded
   Tertiary Health unit 2500 bedded
3. Social Physician → 3m / 12m internship post MBBS in PSM
4. School health
5. Comprehensive H. care concept
   a. Promotive → Primordial level
   b. Preventive → Primary level
   c. Curative → secondary level

BALWANT RAI MEHTA COMMITTE [1957]

1. Panchayati Raj Institutions [PRI's]
2. 3 tire rural health infrastructure
   Zila Parishad → District
   Panchayat samiti → Block
   Panchayat → village

RENUKA ROY COMMITTE [1961]

→ Function of School health services [SHS]
→ Provision of School meals
→ Medical Examination & involvement of parents

MODALIYAR / HEALTH SURVEY & PLANNING COMMITTE [1962]

1. 1 PHC / 40,000 populatn
2. All India Health services (AIHS)
3. Strengthen district hospitals & specialist services

CHADDA COMMITTE [1963]

for maintainance phase of National malaria Eradicatn Programme

1. 1 Basic health worker / 10,000 populatn

MUKERJI COMMITTE [1965,66]

1. Delink Malaria & Family planning
2. Basic health Services

JUNGALWALA COMMITTE [1967] / Committe on integratn of Health Services

1. Integratn of health services in India
2. Equal pay for equal work
   (Specialised pay for specralised work)
3. Ban on private practice by Govt. Doctors

KARTAR SINGH COMMITTE (1973) / Committe on MP workers under Health & FP

1. Multipurpose Workers
2. 1 PHC / 50,000 populatn
3. 1 Male Health supervisor, 1 female health supervisor

SRIVASTAVA COMMITTE (1975) / Group on Medical Educatⁿ & Support Manpowers

1. Bands of semi - & para - professional H. Workers
2. Village Health Guides
3. H. Assistants
4. ROME SCHEME [Re Orientatⁿ of Medical Educatⁿ]
5. Referral services complex

   Primary ⟶ Secondary ⟶ Tertiary
6. Medical & Educatⁿ commission

KRISHNAN COMMITTE (1983)

1. Urban Revamping System

BAJAJ COMMITTE (1986)

1. formulatⁿ of National Medical & Health Educatⁿ policy
2. formulatⁿ of National Health manpower policy
3. Education commission
4. Health manpower cells

HLEG COMMITTE (2011) [High level Expert Group Committe]

1. Universal health coverage
2. 3½ year MBBS Course [actually BRHC course]

HM TECHNIQUES , INVENTORY CONTROL

HM TECHNIQUES

1. Cost Benefit analysis [CBA]

→ Output of a H. programme is in monetary terms

→ Eg. RNTCP 2018 Saved 40 m. US $

2. Cost effectiveness analysis (CEA)

→ Output of a H. programme in terms of RESULTS

→ Eg. RNTCP 2018 Saved 32000 lives

→ Comprehensive indicator of CEA QALY [Quality adjusted Life year]

3. Input output Analysis

→ Input → Cost

Output → Results

Monetary

4. Systems Analysis

→ comparision of 2 or more cost effective alternatives in a H. programme

→ Eg. Sputum Smear — 90% Sensitivity — 10/-

PCR — 100% Sensitivity — 2000 - 4000/-

5. NETWORK Analysis

5A Pert programme Evaluat^{n} & Review technique

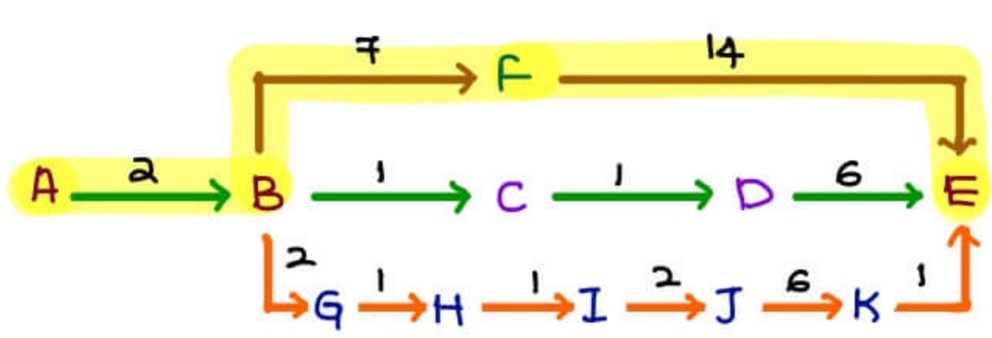
5B CPM – Critical Path Method

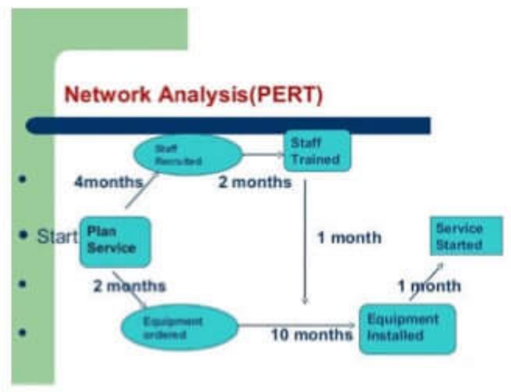
↓

Longest

PERT → sequence of activities in a health programme to plan, schedule, monitor & furnish timely Reports

→





CPM → Critical path → Total durat^{n} of activities which is longer

6. Cost Accounting (Financial & Resource Allocat^{n})

→ Provides basic data on a cost structure of a H. programme.

→ Eg.

10 m US $	2m	for Dx
RNTCP	5m	for Rx
(2018-19)	3m	for Salary & Infrastructure

7 PPBS [Planning Programming & Budgeting System]

→ Allocat^{n} of resources to help achieve objectives in most efficient way

ZERO Budget Approach

→ No fresh Budget allocat^{n} until & unless previous budget is ZERO [Spent]

→ Financial year

01 ⟷ 31 March

8. Work Sampling

→ Systematic observat^{n} & recording of activities of one or more individuals carried out at pre determined or Random intervals

→ Hospitals ← Doctors, Nurses

9. SWOT Analysis

RNTCP

→ Strengths → DOTS 100% coverage, Rifampicin – highly bactericidal

Weaknesses → Stigma attached

Opportunities → Vaccine Research, Newer drugs

Threats → TB – Hiv coinfect^{n}, Resistance

Strengths	Weaknesses
• **Knowledge:** Our competitors are pushing boxes. But we know systems, networks, programming, and data management. • **Relationship selling:** We get to know our customers, one by one. • **History:** We've been in our town forever. We have the loyalty of customers and vendors.	• **Price and volume:** The major stores pushing boxes can afford to sell for less. • **Brand power:** We can't match the competitor's full-page advertising in the Sunday paper. We don't have the national brand name.
Opportunities	**Threats**
• **Training:** The major stores don't provide training, but as systems become more complex, training is in greater demand. • **Service:** As our target market needs more service, our competitors are less likely than ever to provide it.	• **The larger price-oriented store:** When they advertise low prices in the newspaper, our customers think we are not giving them good value. • **The computer as appliance.** Volume buying of computers as products in boxes. People think they need our services less.

INVENTORY CONTROL

→ Stocks usage & Maintainance so as to be able to meet demands (out any delay, avoid wastage (lit improper storage or expiry while keeping costs of holding stocks to a MINIMUM

ABC ANALYSIS

A lways
B etter
C ontrol

→

	(A)	(B)	(C) → ORS, PCM
BUDGET	70%	20%	10%
No. of Items	10%	20%	70%

VED Analysis

Vital Drugs / items
Essential Drugs / items
Desirable Drugs / items

	(V)	(E)	(D)
No. of items	10%	40%	50%
Absence be tolerated	can't be	Some time	Long time

SDE ANALYSIS

Scarcely available
Difficulty available
Easily available

FSN Analysis

Fast moving → ORS, PCM
Slow moving → Doxycycline
Non moving → Adrenaline

GOLF ANALYSIS

Govt controlled Supplies
Open market Supplies
Local Supplies
foreign market Supplies

HML ANALYSIS

High cost
Medium cost
Low cost

SOS ANALYSIS

Seasonal
Off - Seasonal

EOQ ANALYSIS

Economic order Quantity

XYZ ANALYSIS

X High investment
Y moderate investment
Z Low investment

BIO STATISTICS

VARIABLES & SCALES

BIOSTATISTICS

→ Applicatn of statistics to a wide range of topics in Medicine, biology & Public health

VARIABLES

→ Anything which can have a different value

Classifications

QUANTITATIVE can be measured & can be compared	QUALITATIVE can't be measured & can't be compared
Weight, Height, Hb, B. Sugar, S. Cholesterol, Pulse Rate, SBP, BMI, °C/°F, Age, Mid arm circumference, Parity, Income	Pain, ABO grouping, Rh system, Diabetes, Anemia, Sex, Religion

CONTINUOUS many possible values & inbetween values	DISCRETE few possible values & No inbetween values
Weight, Height, Hb, B. Sugar, SBP, °C/°F, Pulse Rate → 145 beats/2m → 72.5 bpm Age, Mid arm circumference, BMI	ABO grouping, Rh status, Sex, Parity, Religion, Anemia (→ yes, → NO), Types of Anemia Severity of Anemia

DICHOTOMOUS only 2 possible values	POLYOTOMOUS >2 possible values
Rh status, Blood group B (→ yes, → NO) Obesity, Anemia	Weight, Height, Hb, B. Sugar, S. Cholesterol, BMI, Pulse Rate, SBP, ABO grouping, Sex, Type of Anemia, Severity of Anemia, TNM Staging, Age, Religion, Parity, °C/°F

→ Weight → Quantitative ⊕ Continuous ⊕ Polyotomous
ABO → Qualitative ⊕ Discrete ⊕ Polyotomous
Rh → Qualitative ⊕ Discrete ⊕ Dichotomous
Parity → Quantitative ⊕ Discrete ⊕ Polyotomous
Age → Quantitative ⊕ continuous ⊕ Polyotomous
Religion → Qualitative ⊕ Discrete ⊕ polyotomous

SCALES OF MEASUREMENT

CATEGORICAL

NOMINAL — Names

ABO , Rh

Anemia , Types of Anumia

Sex

ORDINAL — Order

TNM Staging of Cancer

Severity of Anemia

HTN classificat^{n}

DIMENSIONAL

METRIC — Measurement

Weight , Height, Hb, B.Sugar, PR, SBP , BMI , S. cholesterol, Age, °C/°F , Parity

→ most of Qualitative scales, measured on categorical scale
most of Quantitative scales, measured on Metric scale

→ Statistically most preferable scale → METRIC > Ordinal > Nominal

METRIC SCALE

INTERVAL	RATIO
No Ratios are possible, Have no absolute zero °C/°F Temp	Ratios are possible, Have absolute zero Weight, Height, Hb, B.Sugar, S. Cholesterol, BMI, Pulse Rate, SBP Kelvin Temperatures

→ majority of metric variable should be measured on Ratio scale except °C/°F

LIKERT SCALE

→ Extremely Satisfied — satisfied — some what satisfied — Dissatisfied — Extremely Dissatisfied

→ Type of Ordinal Scale

→ Based on CONTINUUM OF Response

GUTTMAN SCALE

→ Statements of increasing intensity

→ Type of Ordinal Scale

→ Based on Continuum of Response

ADJECTIVAL SCALE

→ Grammatical words of increasing intensity

→ Hot — warm — Lukewarm , Chill — cool — pleasant

→ Type of ordinal scale , based on continuum of response

LIKERT SCALE	GUTTMANN SCALE	ADJECTIVE SCALE
→ Words → ∪ Bidirectional	→ complete sentences → ⌒ unidirectional	→ Words → ⌒ unidirectional

VISUAL ANALOG SCALE [VAS]

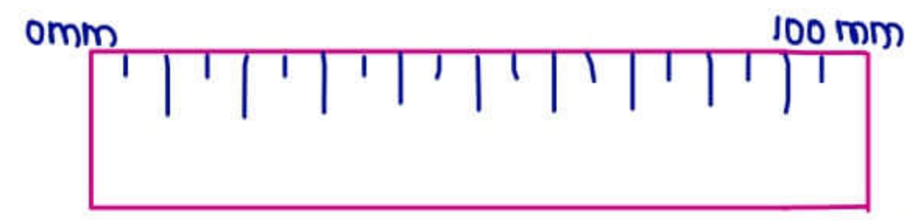
→ used for measurement of pain

→

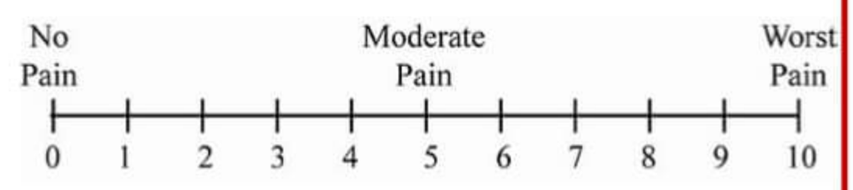
→

→ used when
pt is illeterati, ICU, under anesthesia, pediatric pts.

→



→ preferred



CENTRAL TENDENCY, DISPERSION

MEASURES OF CENTRAL TENDENCY

Mean → $\frac{\text{Sum of all the observations}}{\text{No. of observations}}$ $\quad \frac{\text{Sum}}{n}$

→ statistical Average

Median → middle value in ascending order [n = odd] or
Average of 2 middle values in Ascending order [n = even]

Mode → most frequent value

Q Marks scored by 9 students
9, 1, 3, 3, 0, 4, 8, 7, 6

Mean → $\frac{41}{9}$ → 4.5

Median → 0, 1, 3, 3, (4), 6, 7, 8, 9

Mode → 3

Q Marks scored by 10 students
9, 1, 3, 3, 0, 4, 8, 7, 6, 9

Mean → $\frac{50}{10}$ → 5

Median → 0, 1, 3, 3, $\frac{4, 6}{2}$, 7, 8, 9, 9 → 5

Mode → 3 & 9 → Bimodal Distribut^n

$\frac{3+9}{2} = 6$ → unimodal Distribut^n

MEDIAN

→ n = odd

$$\left[\frac{n+1}{2}\right]^{th} \text{ value}$$

→ n = even

$$\frac{\left[\frac{n}{2}\right]^{th} + \left[\frac{n}{2}+1\right]^{th}}{2}$$

→ Mean > Median > Mode

Stastistically most preferable measure of central tendency → Mean

→ Best measure of central tendency, if Data is

- Nominal → Mode
- Ordinal → Median
- Metric → Mean
- Skewed metric → Median
  - OUTLIERS
  - Wt of 6 Students of a class

    50, 46, 48, 50, 52, 54 → Mean ✓

    50, 46, 48, 50, 52, 154 → Median ✓

    154 — OUTLIER
  - Test used for identificatn of outliers

    DIXON'S Q TEST

    GRUB'S TEST [used for normal distributed data]

    CHAUVENET'S CRITERION

    PIERCE CRITERION

Q Mean Hb → 12

Median Hb → 13

Mode Hb → ?

→ MODE → 3 Median − 2 Mean → only applicable for Bimodal Distributn

→ Mode → 3 (13) − 2 (12) → 15

Q n = 20 Students

One student i highest weight [58 Kg] was recorded 85 Kg

Mean → increases

Median → SAME

Mode → SAME

DISPERSION

→ Spread of (or) scattering of values around a central value in a data distribut^{n}

→ Measured by

Individual OBservations	Samples
Range	Standard Error
Interquartile Range	SE of Mean
Mean deviation	SE of difference b|w two means
Standard deviation [mc used]	SE of Proportion
co-efficient of variat^{n}	SE of difference b|w two proportions
variance	

STANDARD DEVIATION [σ]

→ Deviat^{n} of each value from the standard value [Mean]

→ n = 100

Mean wt = 60kg

		(D)	(D^2)
W_1	= 64kg	+4	16
W_2	= 56kg	−4	16
W_3	= 62kg	+2	4
W_4	= 60kg	0	0
|	|	|	|
W_{100}			

Total SD = ZERO ↓ [limitation]

RMSD [Root of Mean of Squares of Deviat^{n} ↓ STANDARD DEVIATION

$\sqrt{\frac{SUM}{n}}$ = 5kg

STANDARD ERROR

→ Deviat^{n} of each sample mean from the populat^{n} mean

→ Sample mean is known as Statistic

Populat^{n} mean is known as Parameter

Q. n = 100

Wt follow (N) distribut^{n}

Mean wt = 50kg

SD OF wt = 1 kg

SE_{Mean} = ?

→ $$SE_{Mean} = \frac{SD}{\sqrt{n}} = \frac{\sigma}{\sqrt{n}}$$

$$= \frac{1kg}{\sqrt{100}} = 0.1\ kg$$

Q. Weight follows (N) Distribut^n

$n_1 = 100$ $\quad$ $n_2 = 200$

$M_1 = 50\ kg$ $\quad$ $M_2 = 60\ kg$

$SD_1 = 1\ kg$ $\quad$ $SD_2 = 3\ kg$

SE of difference b/w 2 sample means = ?

→ SE of difference b/w 2 sample means → $\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$

→ $\sqrt{\frac{1^2}{100} + \frac{3^2}{200}}$ → $\sqrt{\frac{1}{100} + \frac{9}{200}}$

Q. Weight follow (N) distribut^n

$n = 100$

$M_{wt} = 50\ kg$

40% obese

$SE_w = ?$

→ SE of proportion → $\sqrt{\frac{pq}{n}}$

p = given proportion

q = 1 − p

→ $\sqrt{\frac{0.4 \times 0.6}{100}}$

Q. Wt follows (N) Distribut^n

$n_1 = 100$ $\quad$ $n_2 = 200$

$M_1 = 50kg$ $\quad$ $M_2 = 60$

40% Obese $\quad$ 30% Obese

→ SE of difference b/w two proportions → $\sqrt{\frac{p_1q_1}{n_1} + \frac{p_2q_2}{n_2}}$

→ $\sqrt{\frac{0.4 \times 0.6}{100} + \frac{0.3 \times 0.7}{200}}$

→ SE does not depend on Mean

VARIATION / VARIABILITY

→ co-efficient of variat^n [COV] → $\frac{\sigma}{M} \times 100$

Weight follows (N) Distribut^n

$n_1 = 100$ $\quad$ $n_2 = 200$

$M_1 = 50\ kg$ $\quad$ $M_2 = 60\ kg$

$SD_1 = 1\ kg$ $\quad$ $SD_2 = 3\ kg$

Which sample is more variation

→ $COV_1 \rightarrow \frac{1}{50} \times 100 = 2\%$ → $COV_2 \rightarrow \frac{3}{60} \times 100 = 5\%$

→ 2 sample has more variation than 1st sample

Variance

Ⓠ Weight follows Ⓝ Distribut^n

$n_1 = 100$ $n_2 = 200$

$M_1 = 50$ kg $M_2 = 60$ kg

$SD_1 = 1$ kg $SD_2 = 3$ kg

Which sample has higher variance

→ $\boxed{V = \sigma^2}$

$V_1 = 1^2$ $V_2 = 3^2$ $\Longrightarrow$ $V_2 > V_1$

Precision

Ⓠ Weight follows Ⓝ Distribut^n

$n_1 = 100$ $n_2 = 200$

$M_1 = 50$ kg $M_2 = 60$ kg

$SD_1 = 1$ kg $SD_2 = 3$ kg

→ $\boxed{\text{Precision} = \frac{1}{SE} = \frac{\sqrt{n}}{\sigma}}$

$P_1 = \frac{\sqrt{100}}{1} = \frac{10}{1}$; $P_2 = \frac{\sqrt{200}}{3} = 4.5$

$P_1 > P_2$

Range

→ Max value − Minimum value OR
expressed as Minimum to maximum

→ Eg − min → 40Kg
max → 100Kg
Range → 60Kg or
40 −100 Kg

Relative Deviate [Z Score]

Ⓠ $n = 100$

Hb shows N Distribut^n

Mean Hb = 13.5 g/dl

SD Hb = 1.5 g/dl

Z score of a student whose Hb is 15 g/dl ?

→ Z Score = $\frac{x - \mu}{\sigma}$

x = given value

μ = mean value

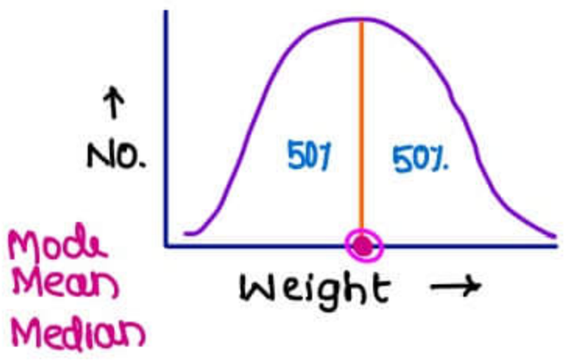
$= \frac{15.0 - 13.5\ g/dL}{1.5\ g/dL} = 1$

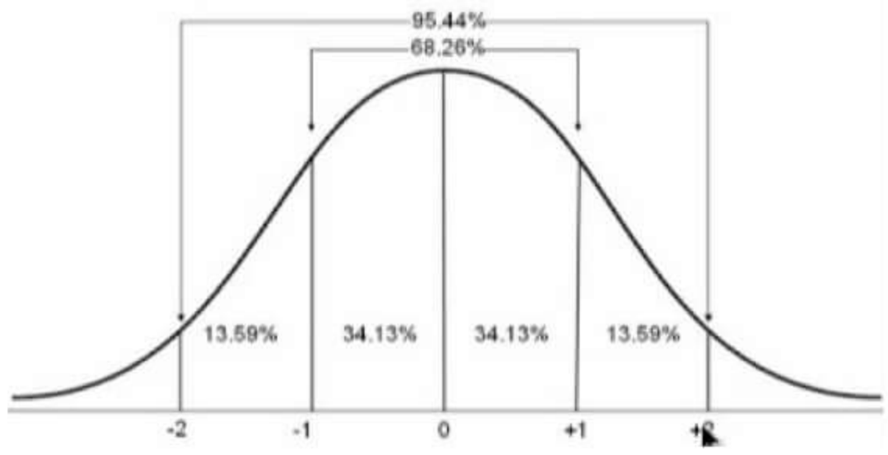
$Z = 1$ → Relatively deviated from mean value

→ Z score can be negative, zero also.

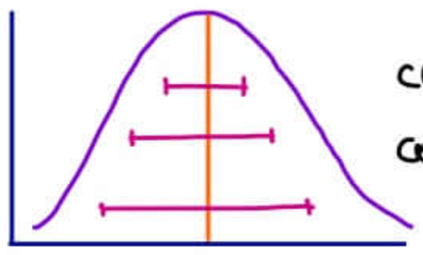
NORMAL DISTRIBUTION & SKEWED DISTRIBUTION

NORMAL / GAUSSIAN / STANDARD DISTRIBUTION





1. B/L Symmetrical Bell shaped curve
2. Mean = Median = Mode → known as coincidence
3. If Mean = 0 in Normal Distribut^n then SD is 1



4. Mean ± 1SD covers 68% value [68.3%]
5. Mean ± 2SD covers 95% value [95.4%]
6. Mean ± 3SD covers 99% value [99.7%]

Q. WND,

$n = 100$

Mean wt = 60 kg

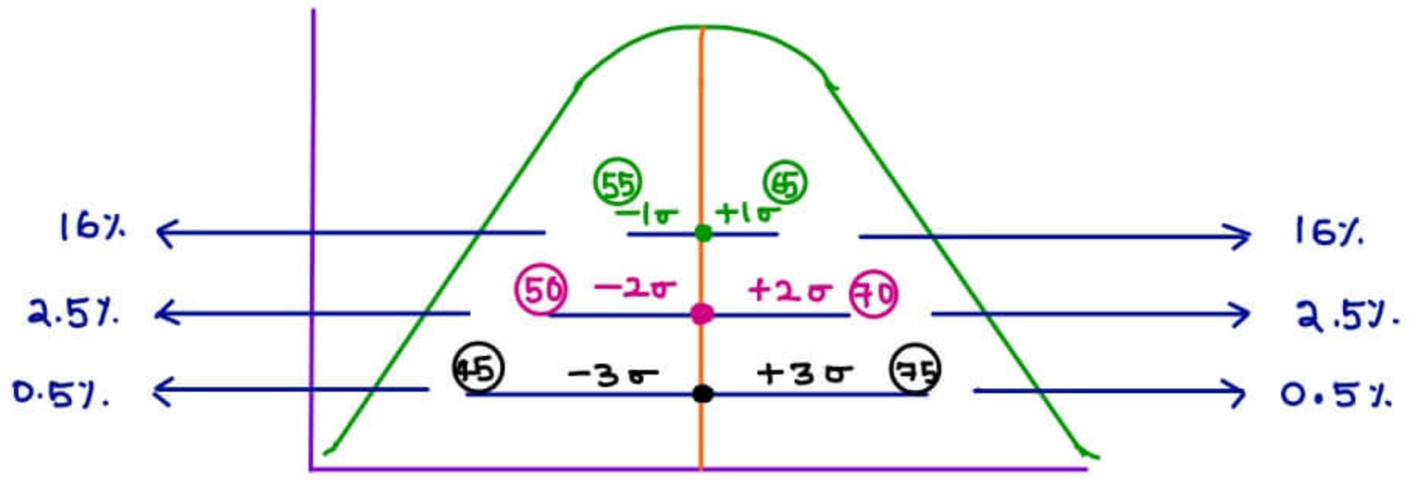
SD W = 5 kg

Q. 95% Student weight lie b/w → 50kg to 70 kg

→ $M \pm 2\,SD = 95\%$

$60 \pm 2[5] = 95\%$

$60 \pm 10 = 95\%$



(Q2) 68% students weight lies b/w 55 Kg to 65 Kg

→ M ± 1SD = 68%.

60 ± 5 = 68%.

(Q3) 99% Students weight lies blw 45 Kg to 75 Kg

→ M ± 3 SD = 99%.

60 ± 3 (5) = 99%.

60 ± 15 = 99%.

(Q4) How many Students will have wt >60 Kg → 50%.

(Q) n = 300 show Normal Deviatn

Mean wt = 70 Kg

SD = 5 Kg

(1) 7-8 no. of students weight > 80Kg

→ 70 ± 1(5) = 68% → 65-75 Kg

70 ± 10 = 95% → 60-80 Kg

70 ± 15 = 99% → 55 - 85 Kg

2.5% ⟵ [60 - 80] ⟶ 2.5%.

• 2.5% of 300 = 7-8

(2) 48 no. of Students werght <65Kg

→ 70 ± 5 = 68% → 65-75Kg

16% ⟵ | 65 - 75 | ⟶ 16%

16% of 300 = 48

(Q) ∞ [NONE] SD covers all 100% values in a ND

→ M ± 1SD = 68%

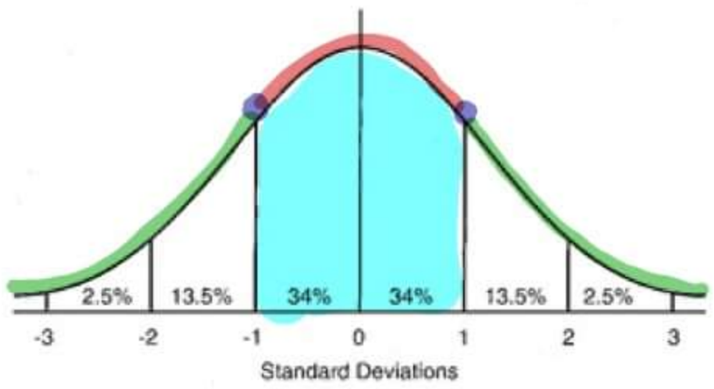
M ± 2SD = 95%

M ± 3SD = 99.7

∞

- Graph never touches base line → floating graph

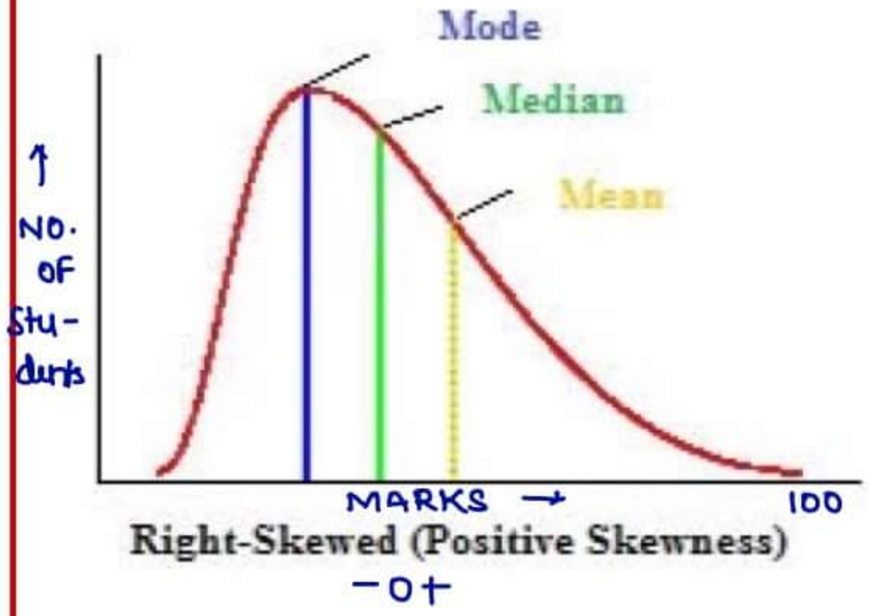
Point of Inflectn



Point of Inflection

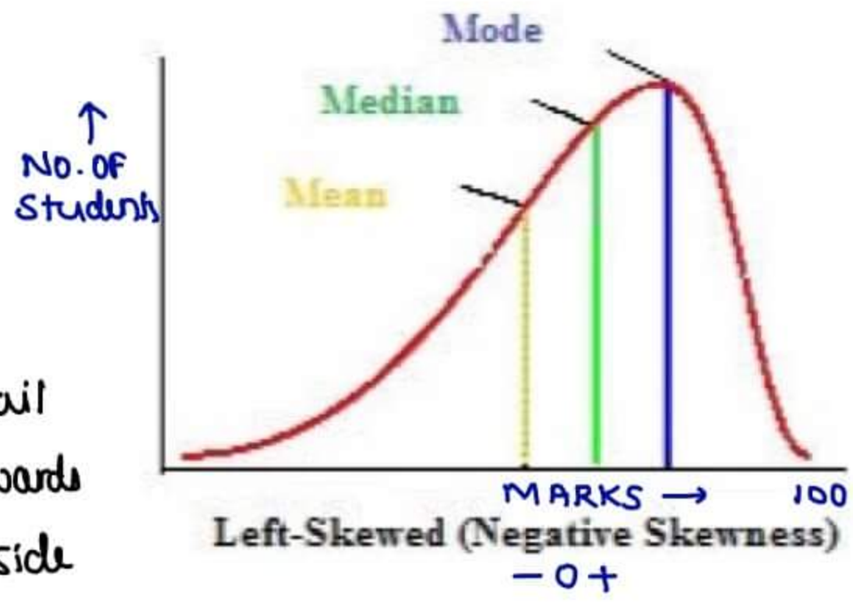
- Where top convex become concave on side
- Locatn of point of inflection on x axis is about 1 SD
- Area covered by the points of inflectn is 68%.

SKEWED DISTRIBUTIONS



Longer tail going towards Rt/ +ive side

Longer tail going towards lt/ −ive side



DIRECTION OF LONGER TAIL DECIDES THE DIRECTION

→ Majority of students fail an exam ĩ Low marks → Rt/ +ive Skewed

→ Majority of students pass an exam ĩ high marks → Lt/ −ve Skewed

CLUSTERING OF VALUES ON LOWER SIDE − RIGHT SKEWED CURVE

CLUSTERING OF VALUES ON HIGHER SIDE − LEFT SKEWED CURVE

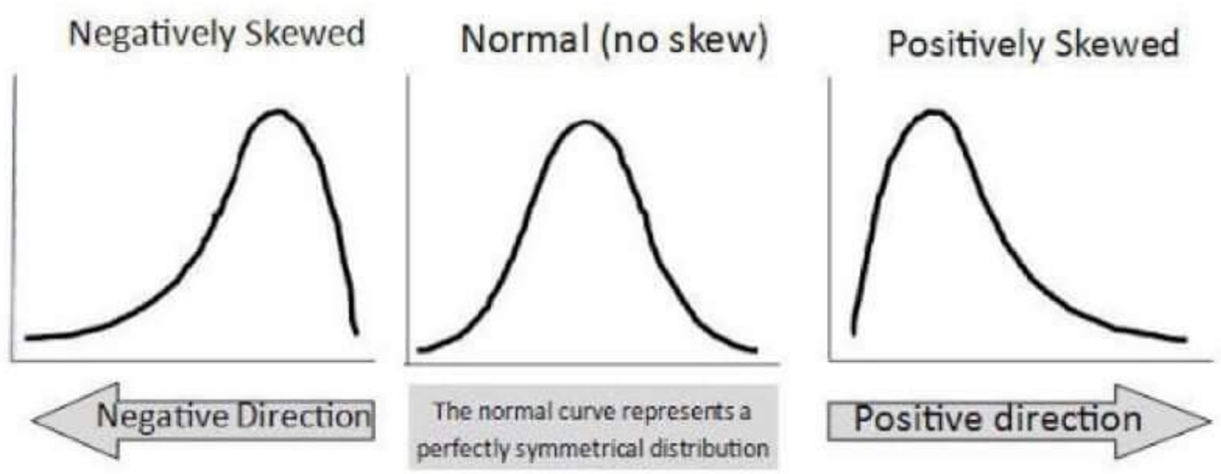
→ Mean > Median > Mode

→ Mode > Median > Mean

POISSON'S DISTRIBUTION

→ No. of events are expressed in unit time

→ No. of OPD patients / day



STATISTICAL ERRORS , P- VALUE , CONFIDENCE INTERVALS

STATISTICAL ERRORS

NULL HYPOTHESIS [H_0]

→ Statement opposite to hypothesis

→ Eg. New Drug 'A' vs Older Drug 'B'

Null Hypothesis – New Drug A is NOT BETTER than Older drug B

Based on Study Results	REALITY: H_0 TRUE	REALITY: H_0 FALSE
Reject H_0	Type I Error	No Error
Accept H_0	No Error	Type II Error

→ H_0 True, Rejected → Type I Error

H_0 false, Accepted → Type II Error

H_0 TRUE, Accepted → No Error

H_0 false, Rejected → No Error

→ Type I Error is more severe than Type II Error

P Value → Propability of Type I Error

α → max. Threshold [permissible] of Type I Error

Globally accepted value of α → 5%.

β → Propability of Type II Error

Q. Which is True ?

a. $P < \alpha$

b. $P = \alpha$

c. $P > \alpha$

(d.) Any of above

Q. Which you want to study

(a.) $P < \alpha$

b. $P = \alpha$

c. $P > \alpha$

d. any of the above

→ If $P < \alpha$ → Results are Significant

P value should be < 5% [0.05]

(Q.) In Cohart Study I, RR = 8, in Smoking study to cancer, P value = 0.07, conclusion → InSignificant Results

(Q.) CS II, RR = 6, P value = 0.04 → Significant Results

(Q.) CS III, RR = 5.2, P value = 0.02 → MORE Signifcant Results

CONFIDENCE LEVEL [1−α]

→ Probability that value of a parameter falls in a specific range.
→ confidence level can be ↑ed by ↓ing α.
→ for significant result → 1 − 0.05 = 0.95 ⟶ 95%

Q. CSI, RR = 8, [CL = 93%] → Insignificant
Q. CSII, RR = 6, [CL = 96%.] → Significant , Q. CSIII, RR = 5.2, [CL = 99%] → more significant

POWER OF A STUDY [1−β]

→ Power of study ↑ed by ↓ing β
→ Probability that a test will reject a false Null Hypothesis

Investigator done

Q. Probability of declaring a significant difference in a study when Actually it is not present

Reality

→ Ho → There is no significant difference
- on Reality → True
- Investigator → Rejected

} TYPE 1 ERROR

CONFIDENCE INTERVAL

→ Interval that may contain a population parameter calculated
→ Gives Estimated range of values
→ Eg.
CHI, RR = 8 [CI → 7.6 − 8.4]
→ formula

$$CI = Mean \pm Z\,[SE]$$

$$CI = Mean \pm Z\left[\frac{SD}{\sqrt{n}}\right]$$

→ $Z_{90\%} \rightarrow 1.645$
$Z_{95\%} \rightarrow 1.96$

Q. n = 100
Mean GFR = 85 ml/min
SD = 25 ml/min
Range of 90% CI ?

→ $CI_{90} = 85 \pm 1.645\left[\frac{25}{\sqrt{100}}\right]$

$= 85 \pm 1.645 \times 2.5$
$= 81 - 89$

larger the sample size, narrowers the CI
Narrower CI is preferable as it tells more precisely that what might be the pop. mean

STATISTICAL TESTS

PARAMETRIC TEST OF SIGNIFICANCE

→ Normal Distributions
→ Quantitative
→ Means, SD
→ paired student's t test
unpaired student's t test
ANOVA [f-test]

NON PARAMETRIC TEST OF SIGNIFICANCE

→ Non normal Distributions
→ Qualitative
→ %, fractions
→ SIGN TEST
CHISQUARE TEST

PARAMETRIC TESTS → used to compare Means, SD in
- PAIRED STUDENT'S t TEST → Paired Data [1 Group]
- UNPAIRED STUDENT'S t TEST → Unpaired Data [2 Groups]
- ANOVA [F-Test] → Unpaired Data [≥3 Groups]

NON PARAMETRIC TESTS → used to compare % or fractions in
- SIGN TEST → Paired Data [1 Group]
- CHI SQUARE TEST → Unpaired Data [≥2 Groups]

→ Sign test analogous to → Paired Student t test
Chisquare test analogous to → Unpaired Student t test
Anova [F-Test]

Q. n = 10
Mean SBP = 142 mm Hg
Drug H x 2 months
Mean SBP = 126 mm Hg

Paired student t test

Q. n = 10
Mean SBP males = 142 mm Hg
Mean SBP females = 126 mm Hg

unpaired student t test

Q. n = 10
MSBP Ward 1 = 142 mm Hg
MSBP Ward 2 = 126 mm Hg
MSBP Ward 3 = 132 mm Hg

ANOVA [F-Test]

Q. n = 100
46 % HTN
Drug H x 2 months
26 % HTN

SIGN TEST

Q. n = 100
40 % Males HTN
26 % females HTN

CHI SQUARE TEST

Q. n = 100
Ward 1 40% HTN
Ward 2 26% HTN
Ward 3 11% HTN

CHI-SQUARE TEST

Z test

→ variation of t test

→ used only if $n \geq 30$

Q. $n = 100$

Mean Hb = 11.2 g/dl

IFA x 12 m

Mean Hb = 12.7 g/dl

Z - test

Q.

Mean Hb = 11.2 g/dl

IFA x 12 m

Mean Hb = 12.7 g/dl

t - test > Z - test

Fischer's Exact test

→ variat^n of chi-square test

→ Used only if $n < 30$

Q. $n = 100$

3/4 th Males anemic

1/3 rd Males anemic

CHI - SQUARE TEST

Q. $n = 20$

3/4 th males anemic

1/3 rd females anemic

FISCHER'S EXACT TEST

Q.

3/4 th males anemic

1/3 rd females anemic

CHI - SQUARE TEST > fischer's Exact Test

CHI- SQUARE TEST

→ Degrees of freedom [DOF]

$DOF = [C-1][r-1]$ ⟶ more Accurate

Q. 3x4 table, DOF = 2x3 = 6

2x2 table, DOF = 1x1 = 1

3x5 table, DOF = 2x4 = 8

4x4 table, DOF = 3x3 = 9

$DOF = n - 1$

Q. $n = 100$, DOF = 99

$DOF = (n_1 + n_2) - 1$

Q. $n_1 = 60$, $n_2 = 40$; DOF = 99

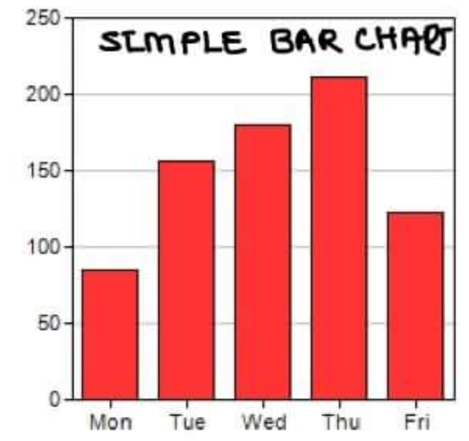
→ Value of chi-square 3.84 for 2x2 table [DOF = 1] at 95% CL ?

DOF \ CL	95%	90%	85%	80%
1				
2				
3				
4				
5				
6				

STATISTICAL GRAPHS, CORRELATION, REGRESSION, LOCATIONS

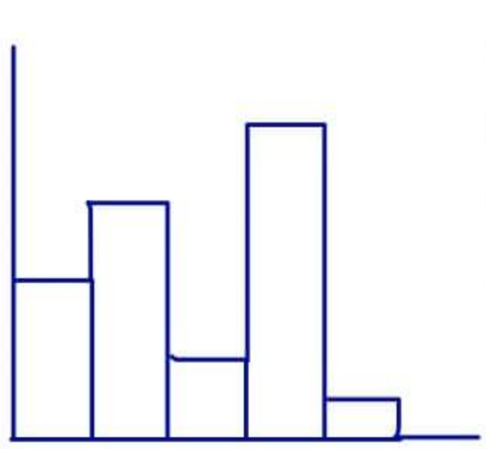
STATISTICAL GRAPHS

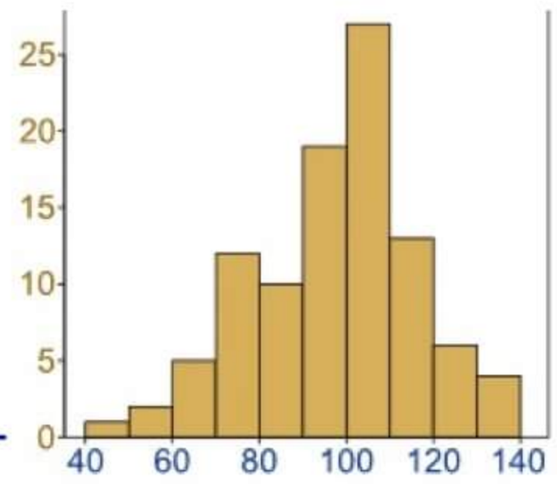
QUATITATIVE	QUALITATIVE
→ Histogram	→ Bar chart
frequency Polygon	Pie chart
frequency curve	Map
Line chart	Pictogram
OGIVE	
Scatter Diagram	



f²LOSH

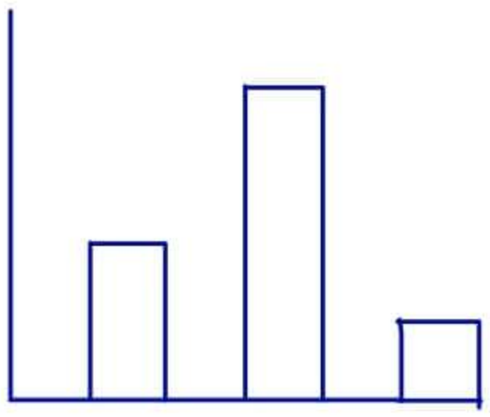
HISTOGRAM

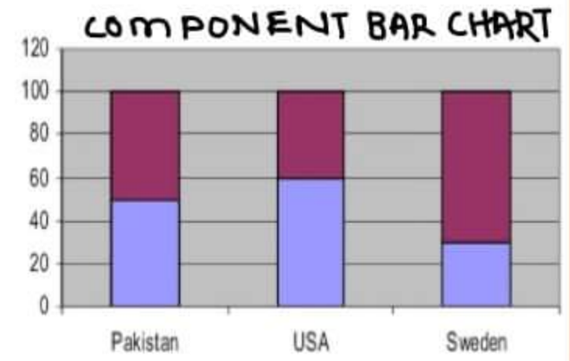


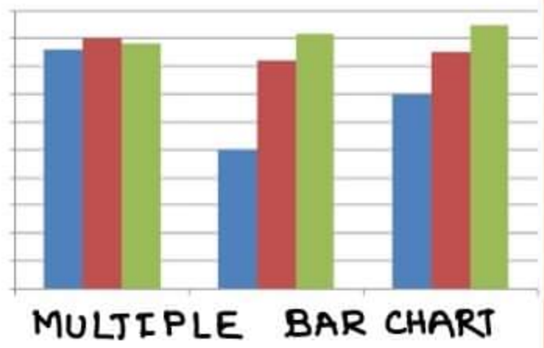


→ continuous Quantitative Data

BAR CHART

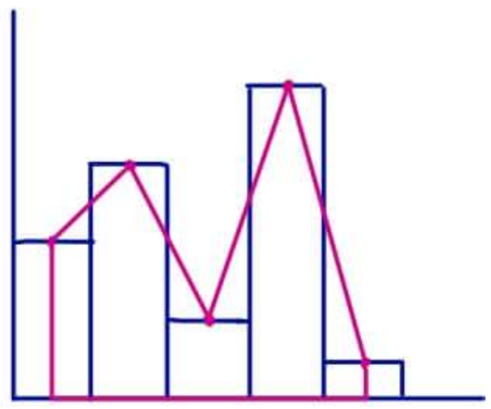


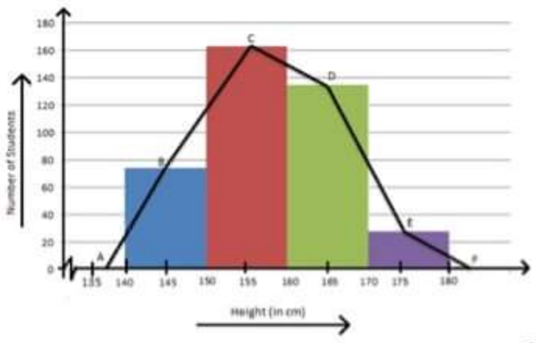




→ Discrete Qualitative Data

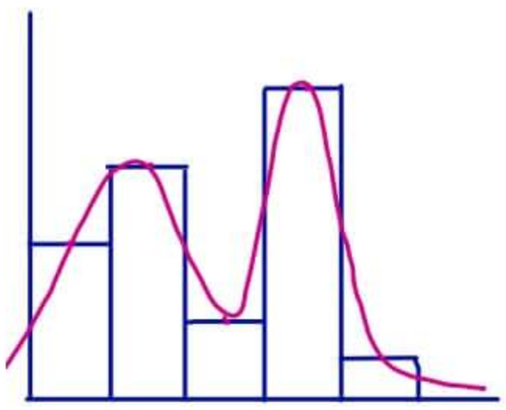
Frequency Polygon

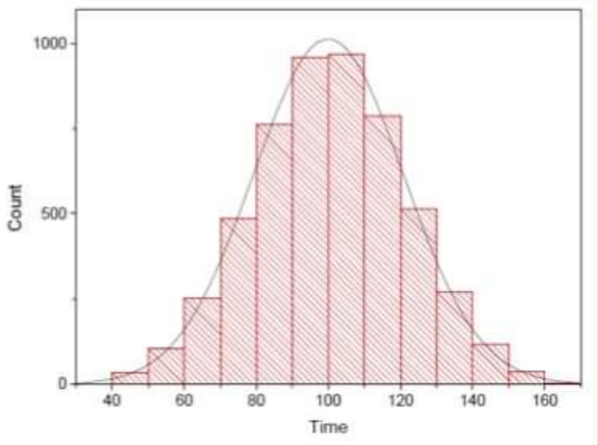




→ By joining the top middle points of each bar in a histogram by a Straight line

Frequency Curve

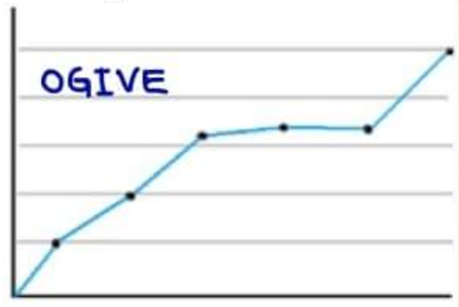




→ By joining the top middle points of each bar in a histogram by a curve line

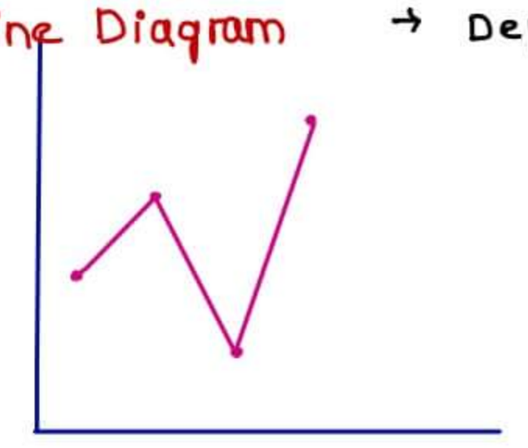
→ Frequency polygon → frequency curve Conversion by

1. ↑ing the sample size
2. reducing the interval size on x-axis



Line Diagram

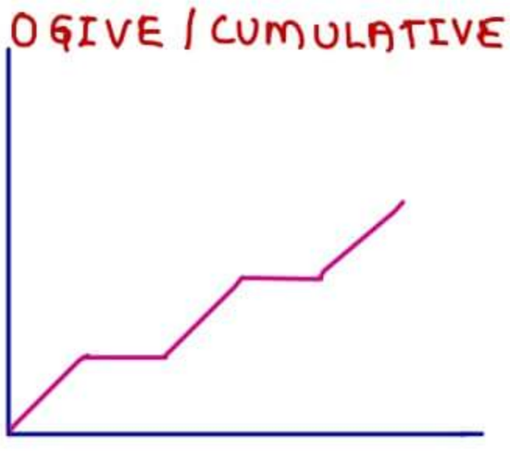
→ Depictⁿ of TREND



→ Differences from frequency polygon

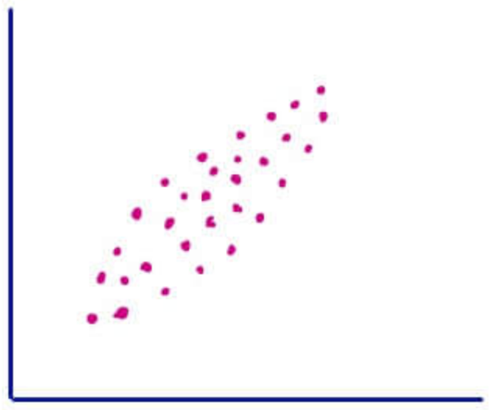
- NO closed loop
- NO Histogram in the background

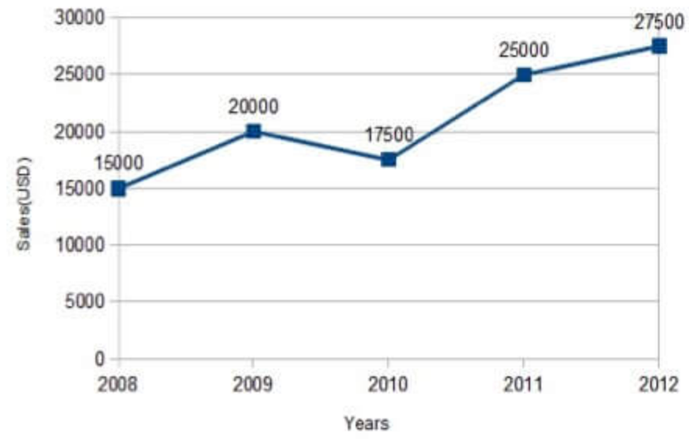
OGIVE / CUMULATIVE FREQUENCY DIAGRAMS



- frequency only ↑ses.
- NO closed loop
- NO Histogram on background

DOT / SCATTER DIAGRAM

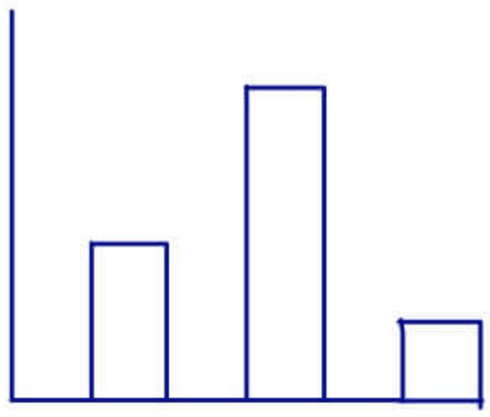




LINE DIAGRAM

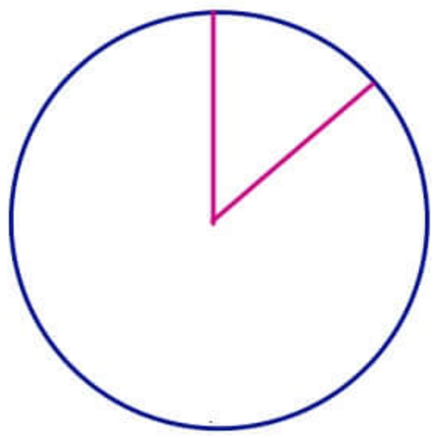
QUALITATIVE GRAPHS

BAR CHART

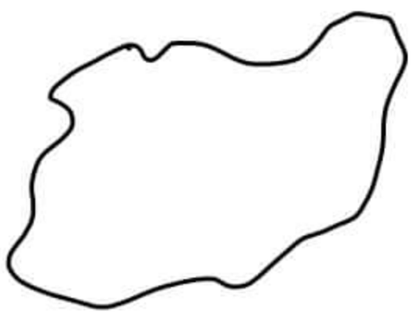


→ Discrete Qualitative Data

PIE CHART / SECTOR CHART



MAP



PICTOGRAM

PIE CHART / SECTOR CHART

1. Total of all categories in the data must be 100% and
2. All categories must be mutually Exclusive

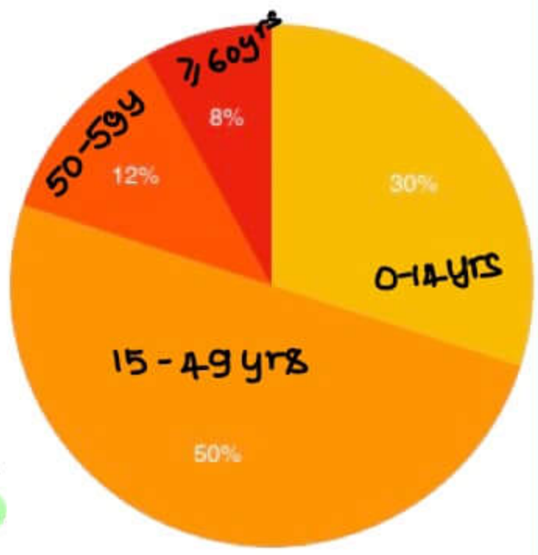
Q. 0-14 yr → 30%
10-19 yr → 20%
15-49 yr → 40%
≥ 50 yr → 10%

100%

→ Pie construction not possible

Q. 0-14 yrs → 30%
15-49 yr → 50%
50-59 yr → 12%
≥ 60 yr → 8%

100%



→ Pie chart construction is possible

Q. If one category is missing,

0 - 14 yrs → 30%.

15 - 49 yrs → 50%.

50 - 59 yrs → 12%.

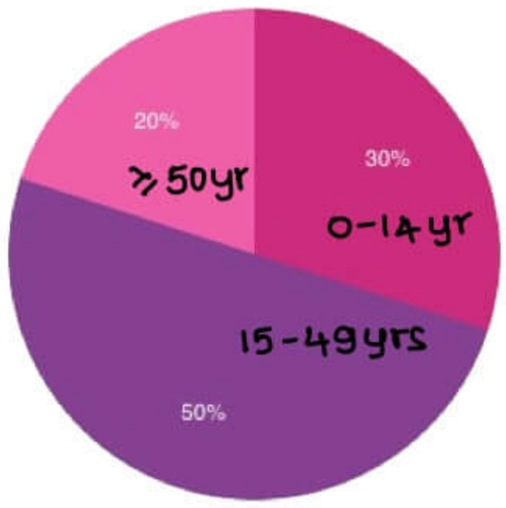
→ Then calculate the missing one i.e, ≥ 60yrs → 100 - 92 → 8% & can construct Pie chart

Q. If

0 - 14 yrs → 30%.

14 - 49 yrs → 50%.

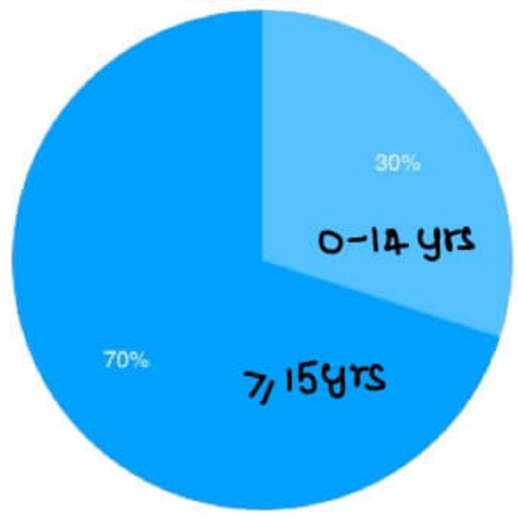
→ Then Remaining ie → ≥ 50yrs → 20%.
& construct pie chart



Q. If

0 - 14 yrs → 30%.

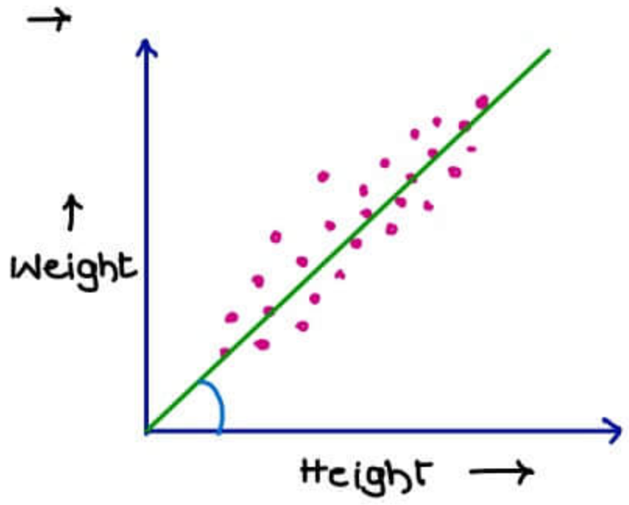
→ Then Remaining i.e., → ≥ 15yrs → 80%
& construct Pie chart



SCATTER / DOT DIAGRAM

→ Used for depiction of CORRELATION [Relationship b/w 2 Quantitative variables]

→

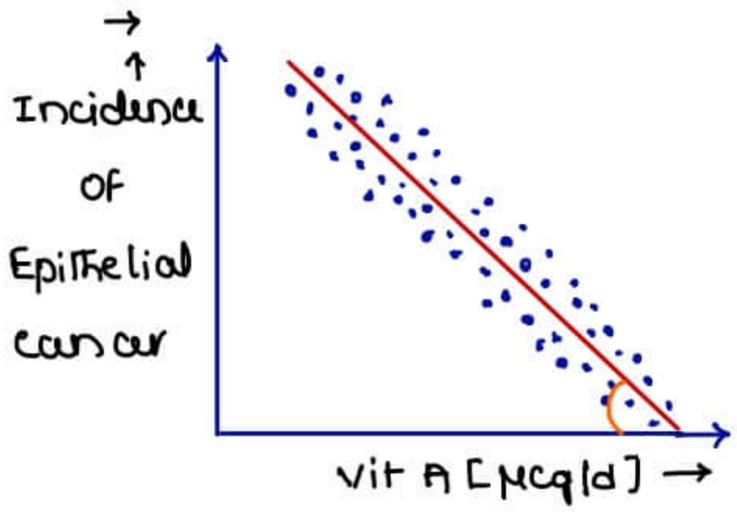


POSITIVE CORRELATION

$0 < \gamma < +1$

→ $\gamma_{H\&W} = +0.8$
Ht & Wt are in positive correlat^{n}

→



NEGATIVE CORRELATION

$-1 < \gamma < 0$

→ Vitamin A is protective for Epithelial cancer

→ $r_{\text{condom use \& HIV Transmission}} \rightarrow 0.9$

- Condom use & HIV transmission are in negative correlat^{n}
- for 1 unit of condom use, there is 0.9 unit decrease in HIV transmission
- Condom usage is protective against HIV transmission

NO / ABSCENT CORRELATION

$\gamma = 0$

In a study Corelatn co-efficient lies between $-1 < \gamma < +1$

Co Efficient of Determinatn

→ % change in one variable that can be explained by change in another variable

→ $COD = \gamma^2$

Q. $\gamma_{Ht\ \&\ wt} = +0.7$

$COD = ?$

→ $COD = [+0.7]^2$

$= 0.49$

$= 49\%$

Interpretatn → 49% ↑ in wt can be explained by ↑ in Ht
other 51% ↑ in wt can be explained by other variables

Q. $r_{vit\ A\ intake\ \&\ Epithelial\ cancer} = -0.9$

COD interpretatn → ?

→ $COD = (-0.9)^2 = +0.81 = 81\%$

Interpretatn → 81% ↓ in epithelial cancer can be explained by ↑ in vit A intake
19% ↓ can be explained by other protective variables

REGRESSION

→ Structure of exact relationship b/w 2 variables

→

$$y = a + bx$$

y → dependent variable [DV]
x → independent variable [IV]
a → Constant
b → Regression co-efficient

TYPES Of Regression

1. $y = a + bx$ → Simple linear Regression
2. $y = a + bx^3$ → Simple curvilinear Regression
3. $y = a + bx_1 + cx_2 + dx_3$ → Multiple linear Regression
4. $y = a + bx_1^2 + cx_2 + dx_3^9$ → Multiple curvilinear Regression

Simple → only 1 independent variable
Multiple → >1 independent variable
Linear → Independent variable has no power [=1]
Curvilinear → At least one independent variables has power

Q $SBP = 4.2 + 6.1\,[Age]^3 + 9.7\,[S.chol]^7$ → Multiple curvilinear Regression
Q $SBP = 4.2 + 6.1\,[Age] + 9.7\,[S.chol]$ → Multiple linear Regression
Q $SBP = 4.2 + 6.1\,[Age]$ → Simple linear Regression
Q $SBP = 4.2 + 6.1\,[Age]^9$ → simple curvilinear Regression

Q Occurance of a disease is dependent on multiple risk factors. which type of Regression it will be?
→ Multiple Logistic Regression

IF dependant variable is
- Polyotomous → Multiple curvilinear Regression
- Dichotomous → Multiple Logistic Regression

→ Occurance of a disease → Dependent variable → Dichotomous → MLR

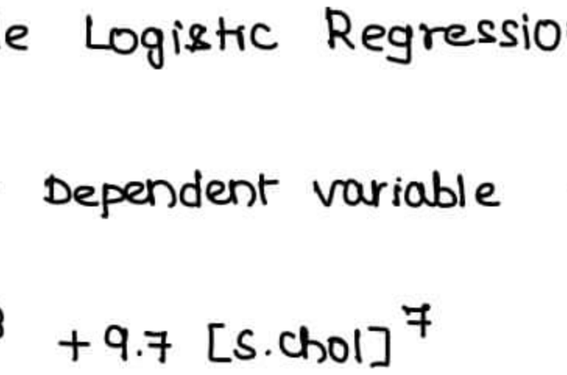
Q. $SBP = 4.1 + 6.2\,[Age]^3 + 9.7\,[S.chol]^7$
→ SBP → Polyotomous → MCLR

Q. $HTN = 4.1 + 6.2\,[Age]^3 + 9.7\,[S.chol]^7$
→ HTN → Dichotomous [yes or No] → MLR

LOCATIONS

→

	DIVIDES INTO Equal parts
Quartiles	4
Pentiles/Qintile	5
Tertiles	3
Percentile/Centile	100



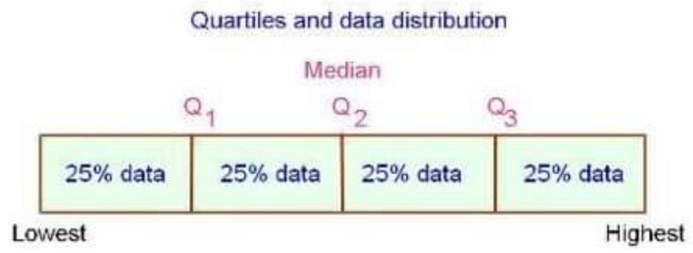
→ Q_1 → 1:3 P_1 → 1:4 T_1 → 1:2

Q_2 → 1:1 P_2 → 2:3 T_2 → 2:1

Q_3 → 3:1 P_3 → 3:2

P_4 → 4:1

Median → Q_2 → 1:1



SAMPLING & SAMPLE SIZE

SAMPLING

RANDOM/PROBABILITY/NON PURPOSIVE SAMPLING

1. Simple Random
2. Systematic Random sampling
3. Stratified Random sampling
4. Multistage Random sampling
5. Multiphase Random sampling
6. Cluster Random sampling

NON RANDOM/NON PROBABILITY/PURPOSIVE SAMPLING

1. Convenience Sampling
2. Quota sampling
3. Clinical Trial sampling
4. Snow Ball sampling

SIMPLE RANDOM SAMPLING

→ Random → Equal & known chance

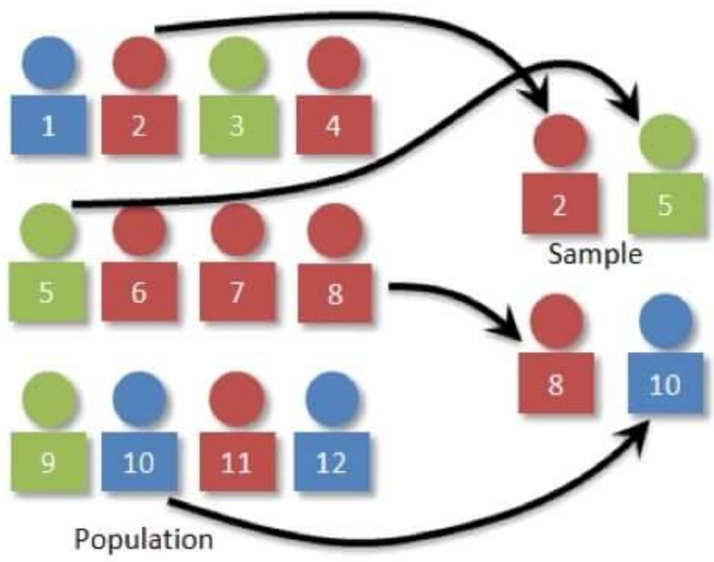
Q n = 100

Average IQ level → ?

→ Sample = 10

Methods of Sampling

1. Lottery Method
2. Random Number Tables Booklet [Most Accurate]
3. Software
4. Currency notes



SYSTEMATIC Random Sampling

→ Sampling fraction / Sampling Interval = $\frac{\text{Total population size}}{\text{Total Sample size}}$ → systematic

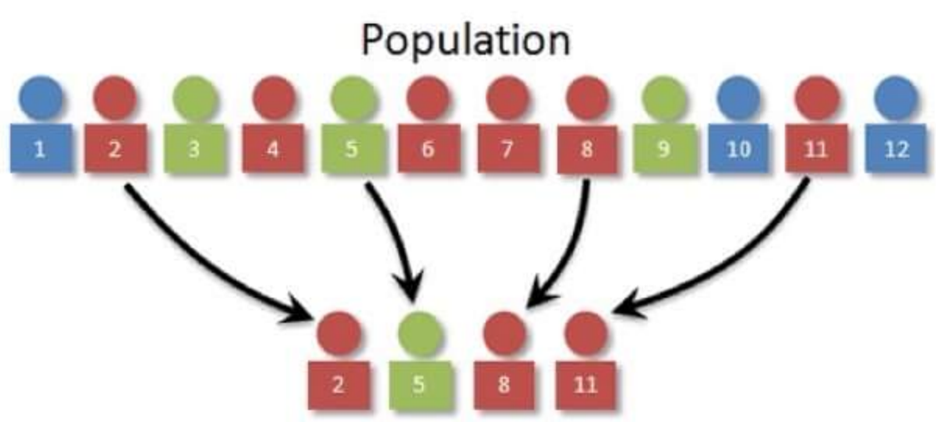
Q n = 100

Sample = 10

Average IQ level

→ SF = $\frac{100}{10}$ = 10

every 10th student selected



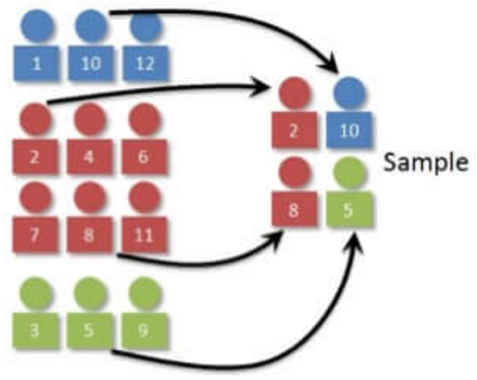
→ Random → In the 1st ROW, Student will be selected by SIMPLE RANDOM Method

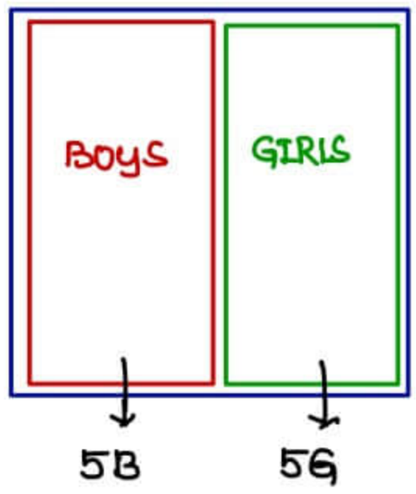
STRATIFIED RANDOM SAMPLING

Q n = 100 Students
- 50 Boys
- 50 Girls

Sample = 10

Avg. Hb level ?





→ STRATIFICATION — convers^{n} of heterogenous populat^{n} to homogenous groups.

→ Then Random Sampling is done from each group/Strata

MULTI STAGE RANDOM SAMPLING

Q n = 100 villages

→ In India → 37 States & Union Territories

↓

5 States

↓

10 Districts

↓

2 villages

↓

100 villages

→ Sampling done in Staging

Randomisat^{n} should be done in each staging

MULTI PHASE RANDOME SAMPLING

Q Sample → 100 Sputum Smear +ive cases Select^{n}

→

10,000 patients / Day OPD

↓

2,000 OPD patients

1000 → NO ← cough > 2wks

1,000 → Yes

500 → SS -ive ← SS Ex.

500 SS +ve

↓

100 SS +ve

→ Phase → part of informat^{n} is Obtained in each stage & Some are excluded based on that informat^{n}.

→ for Randomizat^{n}, either 1st or last stages are used

CLUSTER RANDOM SAMPLING

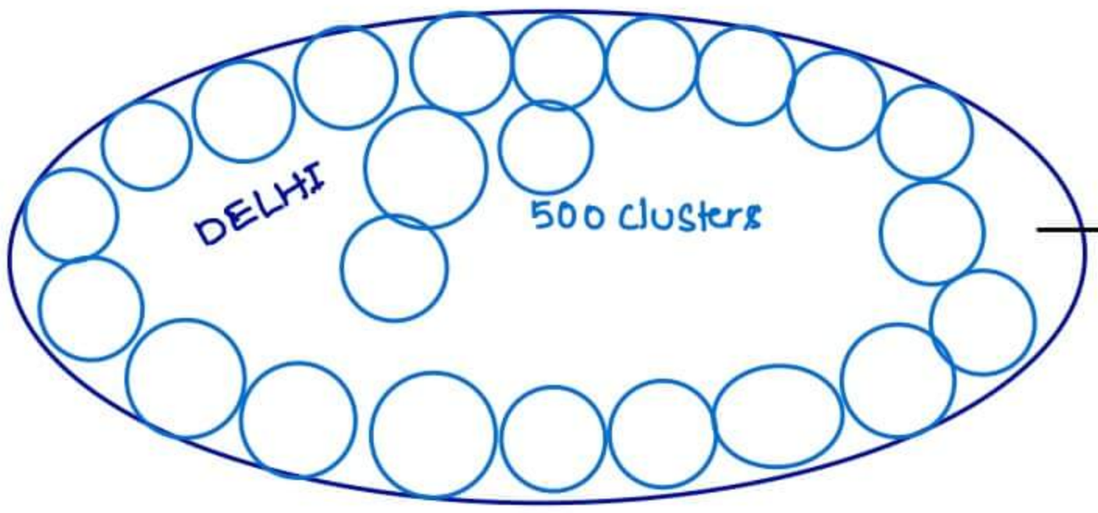
→ Used for Immunizat^{n} coverage evaluat^{n}

- Simple RS
  Systematic RS
  Stratified RS
  Multistage RS
  Multiphase RS
  } Error is about ± 30%. for immunizat^{n} Evaluat^{n}

- CRS Error Rate for Immunizat^{n} coverage Evaluat^{n} → ± 5%

→ WHO Recommended Technique → 30 × 07
↓ clusters ↓ children [12-23 months of age]

→ Eg.



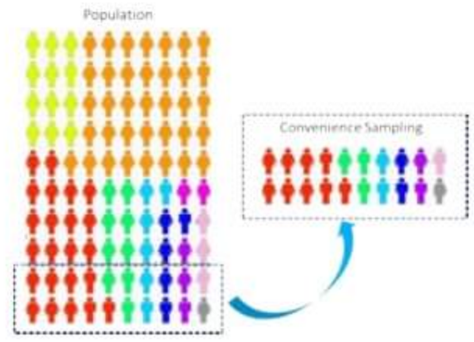
→ 30 clusters are selected by Systematic Random Sampling
↓
Select 1st 7 children of each cluster

→ Total sample size → 210 [30×7]

→ Intercluster disparity → Even the clusters are not comparable to each other
- To remove intercluster disparity, we use DESIGN EFFECT

CONVENIENCE SAMPLING

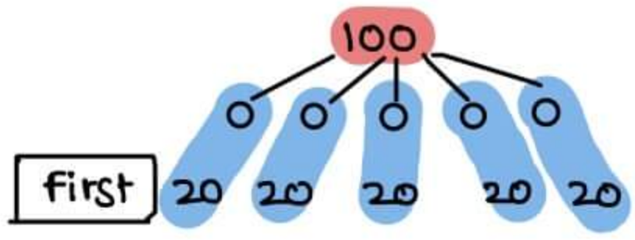
Q Avg. Hb level of all medical students [5 medical colleges] → ?
Sample size = 100



→ Sampling according to convenience [Availability] of Investigator
→ Non Random sampling

QUOTA SAMPLING

Q Avg. Hb level of all medical students [5 medical colleges] → ?
Sample size = 100



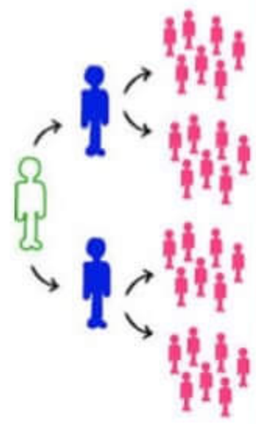
→ BIG SAMPLE is divided into smaller Quotas &
within each Quota there is Convenience Sampling

→ Non Random version of → STRATIFIED RANDOM SAMPLING

SNOW BALL SAMPLING

→ used for Hidden Population

- commercial Sex workers
- Injecting Drug users
- HIV +



CLINICAL TRIAL SAMPLING

→ Always done First come first Basis

SAMPLE SIZE ESTIMATION

Q Prevalence of candida = 50%.
What is the minimum sample size required to estimate prevalence of candida at 95%. Confidence level ?

→ Type of cross sectional study
formula for cross sectional study is

$$\text{Sample size} = \frac{4pq}{L^2}$$

P = prevalence from older study
q = 1 − p
L = permissible error
CL = 95%
L = 5% → 0.05

$$= \frac{4 \times 0.5 \times 0.5}{(0.05)^2}$$

$$= 400$$

→ Even if P is unknown, by default take it as 50%.
Even if CL is unknown, by default take it as 95%.

PROBABILITY & ODDS

PROBABILITY

→ A chance that an event will occur
→ 0 < Probabity < +1

Rule of Addition	RULE OF Multiplicatn
→ for mutually exclusive events P[T] = P[A] + P[B]	→ for independent events and we asked their joint probability P[T] = P[A] × P[B]
→ BW < 2.5 kg → 0.30 2.5 - 2.999 → 0.20 ⩾ 3 kg → 0.50 Probability of a child > 2.5 kg ? P[T] = 0.20 + 0.50 = 0.70 Probability OF a child < 3kg → 0.5	→ BW < 2.5kg → 0.30 | Male → 0.50 ⩾ 2.5kg → 0.70 | female → 0.50 Probability of a child BW ⩾ 2.5kg, Male ? P[T] → 0.70 × 0.50 → 0.35 → 35%. Probability of child BW ⩾ 2.5kg, female → 35% BW < 2.5, Male → 0.15 ; female → 0.15

@ Prevalence of DM = 10%.

Probability that all 3 persons randomly selected have DM?

→ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$

- Each event is independent to each other

- $\frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \frac{1}{1000} = 0.001$

ODDS

→ Chances of occurence of a specific event relative to its non occurence

→ $$\text{ODDS} = \frac{\text{Probability}}{1 - \text{probability}}$$

→ Eg

Probability of Mr. Ram developing MI in his lifetime is 75%. What are the odds of developing MI

- $$\text{ODDS} = \frac{0.75}{0.25} = 3:1$$

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MCQ's to revise

What I learnt / Summary

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