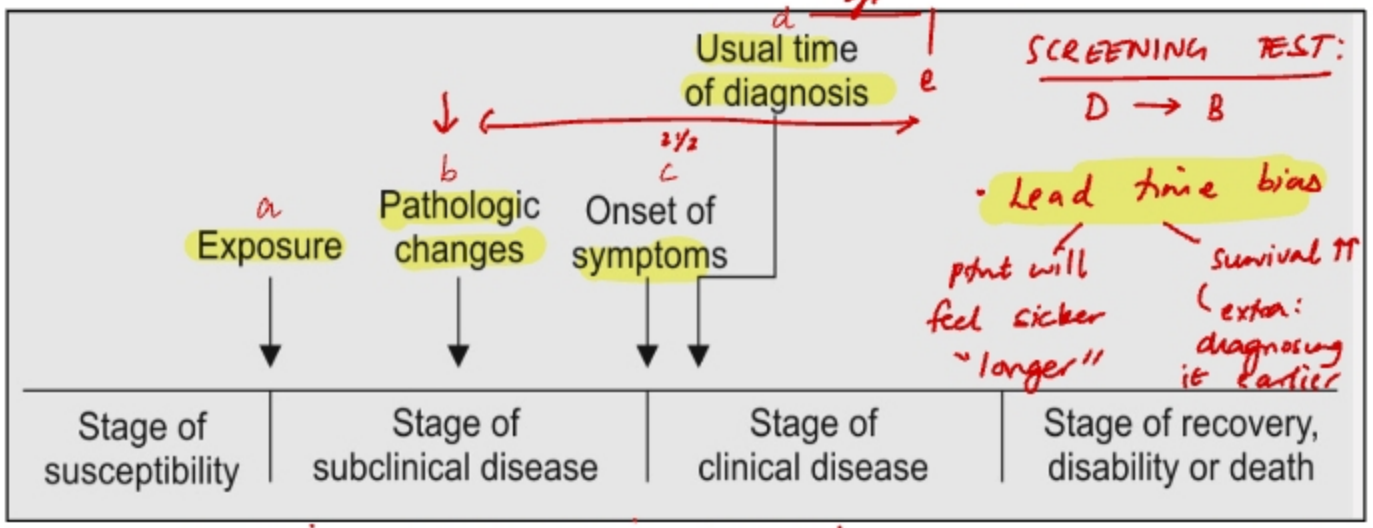
PSM

CONCEPT OF HEALTH

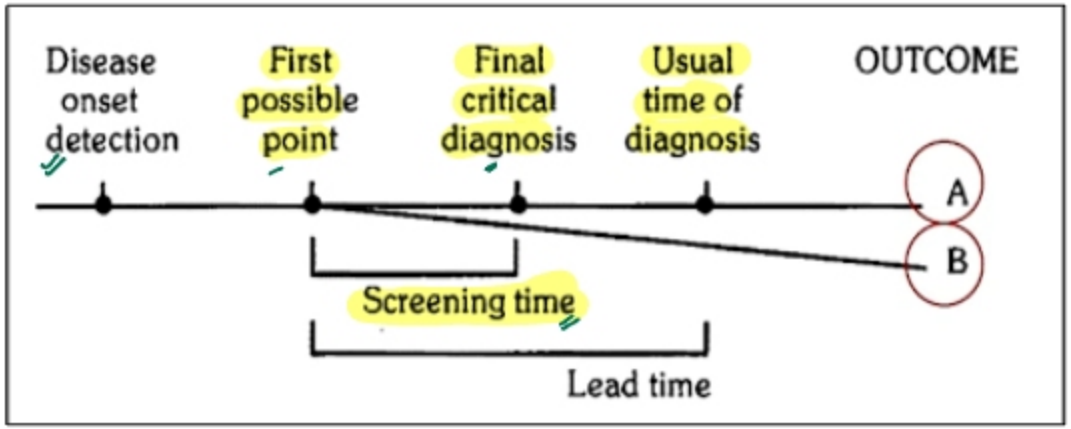


SCREENING TEST: D → B

- Lead time bias
  - point will feel sicker "longer"
  - survival ↑↑ (extra: diagnosing it earlier)

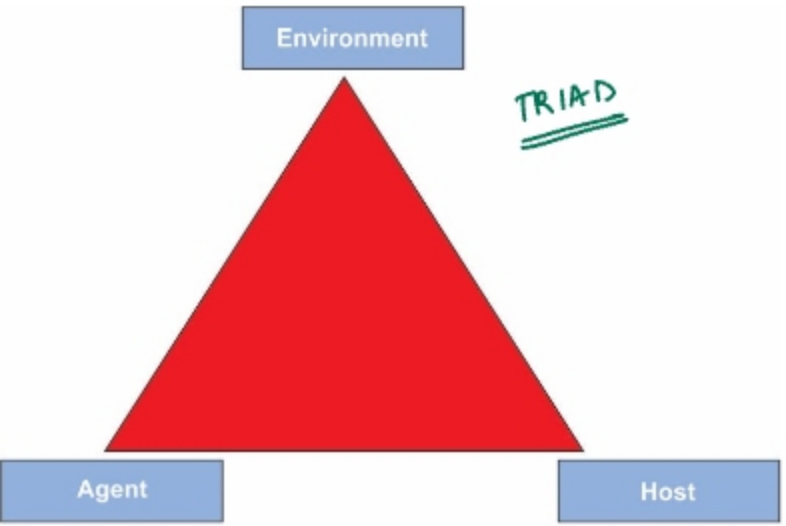
Screening - asymptomatic diseased

- Length time bias
  - slowly progressive diseases detected

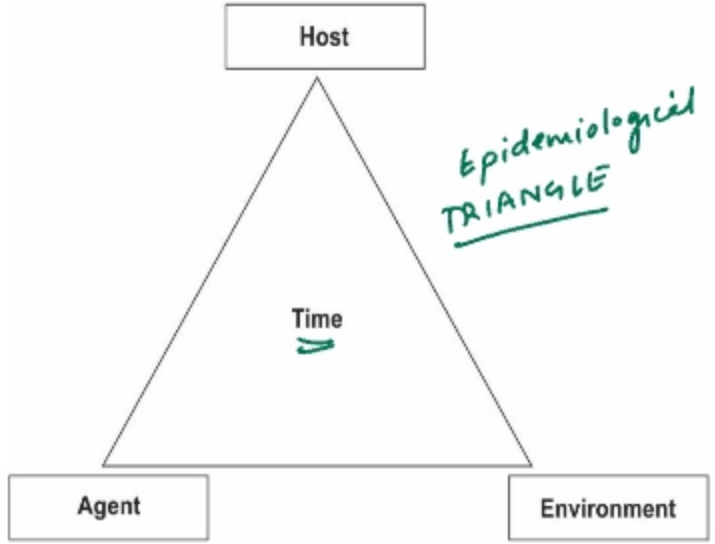


First case in community: Primary case
First observed case: Index case
Time between primary and secondary case: Serial interval
Time between entry of organism and symptom: Incubation period
Time between entry of organism and max communicability: Generation time
Isolation: diseased - 1° > 2°
Quarantine: exposed, not diseased - max ip

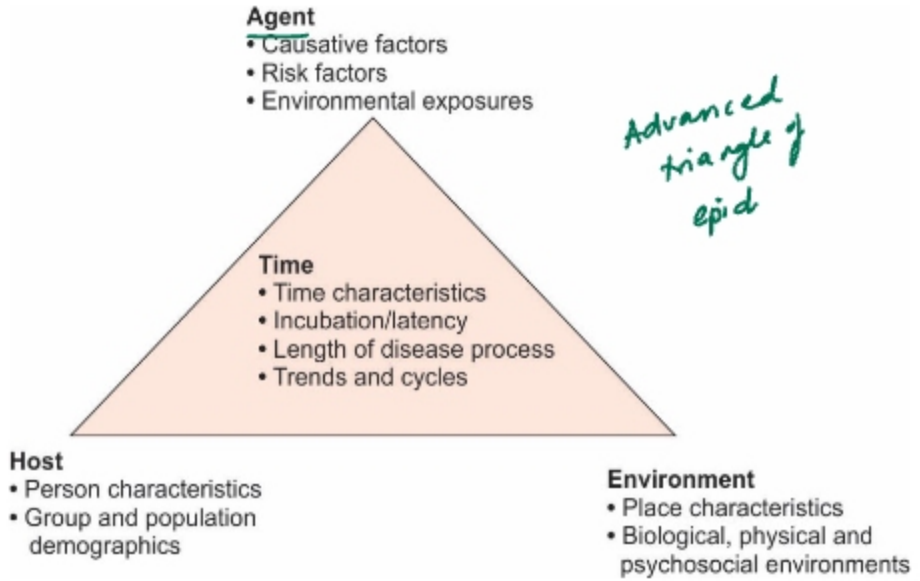
QP of Yellow fever: 6d



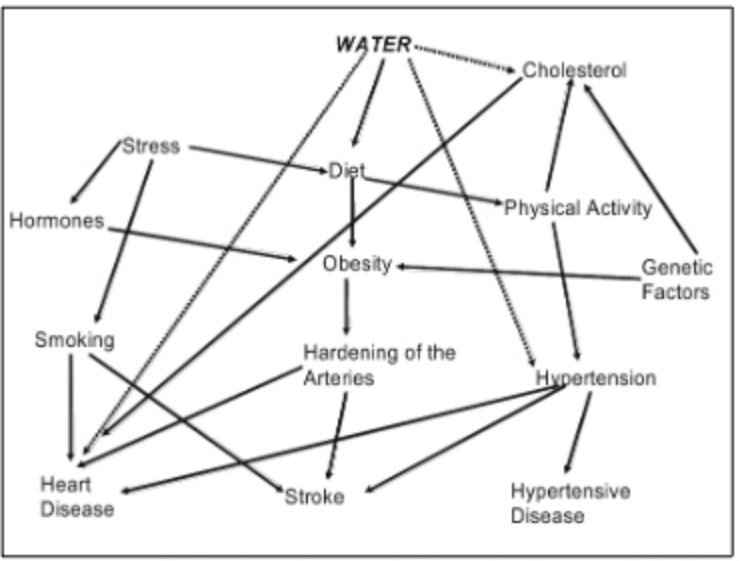
TRIAD



Epidemiological TRIANGLE

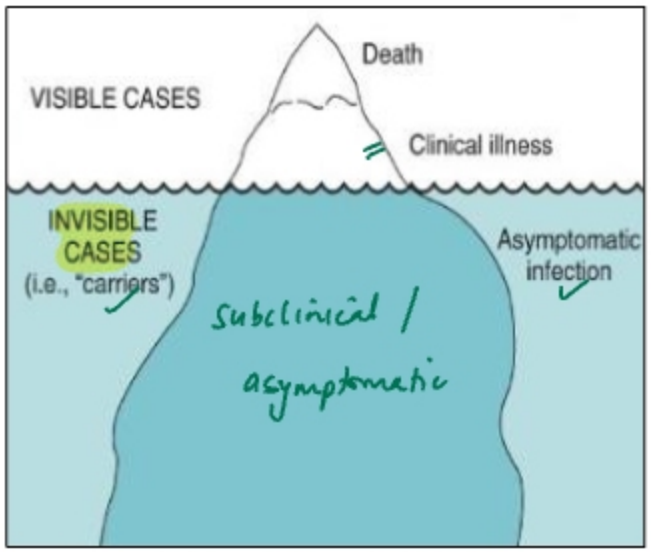


Advanced triangle of epid



Web of causation NCD

L McMahon-Pugh

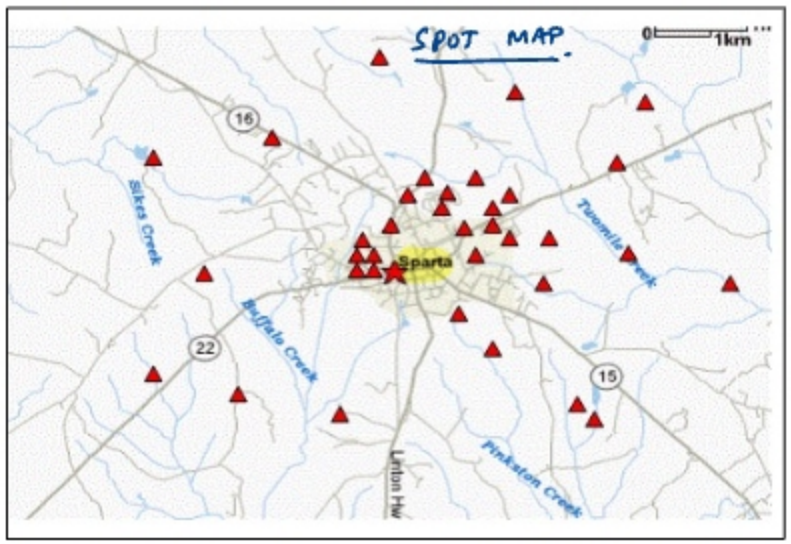


TIP OF ICEBERG

except

Measles Tetanus Rabies

(± Rubella)



Shoe-Leather epidemiology
(Natural experiment)
Father of epidemiology: John Snow
Definition of epidemiology: John Last

Epidemiology formulae

Measure	Examples
Proportion (%)	• **Prevalence** = $\frac{\text{total cases (new + old)}}{\text{total popn}} \times 100$ ✓ **Attack rate** = $\frac{\text{new cases}}{\text{popn at risk}} \times 100$ (inf) ✓ **Secondary attack rate** = $\frac{\text{new cases in 1 ip}}{\text{popn at risk} - 1^\circ \text{case}} \times 100$ (inf) = **Communicability** Basic reproductive no (R0) $\begin{cases} >1 \rightarrow \uparrow\uparrow \\ =1 \rightarrow \text{stable} \\ <1 \rightarrow \text{decline} \end{cases}$ • **Case fatality rate** = $\frac{\text{deaths}}{\text{total no. of cases}} \times 100$ • **Killing power/ Virulence** • **Proportional mortality rate** = $\frac{\text{deaths by a cause}}{\text{total deaths}} \times 100$ • **Simplest measure of burden**
Rate (PER UNIT TIME)	• **Incidence** = $\frac{\text{no. of new cases per unit time}}{\text{popn at risk}} \times 1000$ • **Maternal mortality rate** $\frac{\text{mat deaths}}{\text{♀ in repr age grp}} \times 1000/1\text{ lakh}$
Ratio	• **Maternal mortality ratio** $\frac{\text{mat deaths}}{\text{LB}} \times 1\text{ lakh}$ • **Sex ratio** ♀/♂

$$P = I \times D$$

	INCIDENCE	PREVALANCE
Increased survival D↑	—	↑
Increased mortality D↓	—	↓
Faster recovery D↓	—	↓
Vaccination	↓	↓
Primordial prevention	↓	↓
More diagnostic screening	↑ (apparent)	↑
Chronic diseases →	P >> I	
Acute diseases →	P = I	

Indirect standardization if age-specific death rates of reference population not available

A couple has four children, all unvaccinated for measles. One child contracted measles on August 5, 2015, and two other children developed measles by August 15, 2015. What is the secondary attack rate?

A) 0%
B) 33%
C) 66%
D) 75%

SAR $\frac{2}{3} \times 100$

(1)

In a village with 100 children, 10 had developed measles in the previous year. In the current year, 20 children developed measles for the first time. What is the incidence rate of measles for the current year?

A) 10%
B) 20%
C) 22.2%
D) 30%

$\frac{20}{100-10\ (90)} \times 100$

$\frac{20}{90} \times 100$

A male is diagnosed with oral Cancer at the age of 40 years. The average life expectancy in the country where he resides is 70 years. Once diagnosed with cancer, he dies at 50 years. Had he taken a medical intervention, he would have survived till age 60 years. Calculate DALY & QALY.

a. 30,20
b. 10,30
c. 30,10
d. 20,10

QALY

DALY = YLD + YLL

10yrs, 20yrs

HEALTH INDICES

Human Development Index (HDI)-UNDP India: 0.68 (Rank-130)	Physical Quality of Life Index (PQLI)-WHO	The Global Hunger Index (GHI) India: 25.8 (Serious hunger)
Knowledge: (Mean & expected years of schooling)	Literacy rate	Proportion of the population that is undernourished
Income: real GNI per capita	Infant Mortality Rate	Prevalence of underweight in children under five (in %)
Life expectancy at birth (20-85)	Life expectancy at one year	Proportion of children dying before the age of five (in %)

DALY: YLD + YLL → BURDEN OF DISEASE (-ve outcome)

QALY: → COST-EFFECTIVENESS - INTERVENTION (ICER)

HALE: Health adj LE - perfect health - disease + disability

DFLE/Sullivan index: Disability free LE

Time distribution of disease

SHORT TERM FLUCTUATION

- EPIDEMICS > mean + 2SD
- PANDEMIC – global scale

endemic – constant

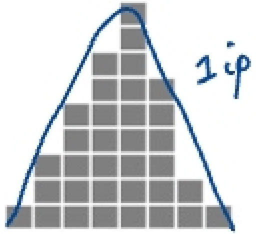
sporadic

LONG TERM FLUCTUATION

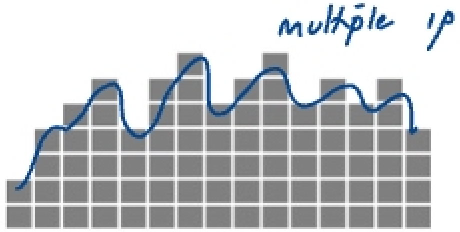
- NCD
- Secular trend

PERIODIC FLUCTUATION

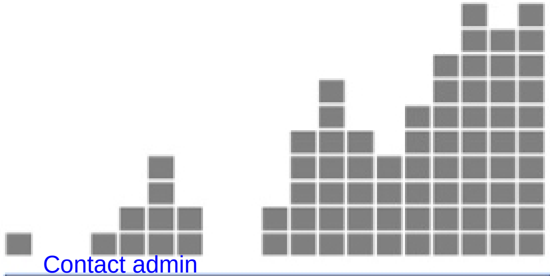
- Seasonal
- Cyclical
  - measles – 2-3yrly
  - rubella – 6-8yrly



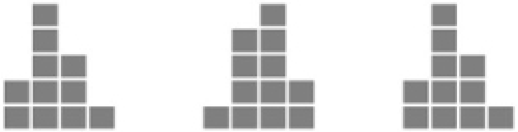
Pt source · Single Exposure



Pt source – Multiple exposure



PROPAGATED



Interrupted

Investigation of an Epidemic

1. Verification of Diagnosis — "operational defn"
2. Confirmation of the Existence of an Epidemic
3. Defining the Population at Risk
4. Rapid Search for All Cases and Their Characteristics
5. Data Analysis
6. Formulation of Hypothesis
7. Testing of Hypothesis
8. Evaluation of Ecological Factors
9. Further Investigation of Population at Risk
10. Writing the Report

Levels of Prevention

Primordial

(x) R/F

Primary

✓ R/F

(x) Disease

Secondary

✓ Disease

Tertiary

✓ Disability

Health Education

- ban smoking

'Regulatory approach'

Health Promotion

"sudhar ja"

Early Diagnosis

SCREENING

Disability limitation
Rehabilitation

CL / speca

Specific Protection

- vaccination
- Contracep"

Treatment

EXAMPLES:

Vaccines- 1°

Post-exposure prophylaxis- 1°

BCG for CA UB- 2°

Contraceptives- 1°

OCP for PCOD- 2°

Physiotherapy for polio- 3°

Chemoprophylaxis in contacts- 1°

Source reduction in malaria- PRIMORDIAL* (Larva ××)

Mosquito repellants / Nets / DDT- 1°

IFA in pregnancy- 1° - proph, 2° - anemia &

Seat belts/ helmets- 1°

DOTS- 2°

Spectacles/ Contact lens- 3°

Prescriptive Screening- Pap/ mammography (2°)

Prospective Screening- 1°

Immigrants for TB, HIV during antenatal, Blood donors

others benefit

- Accident-
- Loss of foot → Impairment
- Cannot walk → Disability
- Unemployed → Handicap

Types of Epidemiological studies

DESCRIPTIVE: formulate hypothesis] observational
ANALYTICAL: test hypothesis]
EXPERIMENTAL: confirm hypothesis

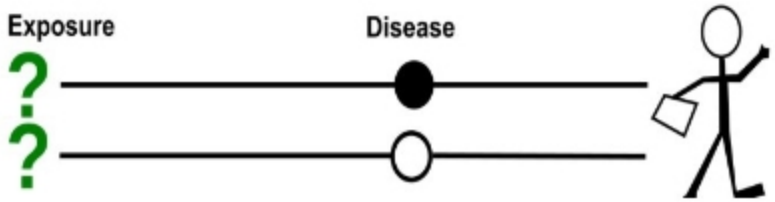
Observational Studies
STROBE

- **Population-Based Analytical:** Ecological= Correlation= Aggregation study
  - Ecological fallacy
  - 2° data
- **Individual Based**
  - **Descriptive:**
    - Case reports
      CARE
    - Case series
  - **Analytical:**
    - Cross-sectional study or prevalence study Or Snapshot study → 1° data
    - Case-control study or case-reference (CASES, CONTROL)
    - Cohort study or follow-up study or Incidence study (EXPOSED, NON-EXPOSED)

Experimental studies
♡ : Randomisation

- **RCT**
  CONSORT
  - Clinical trials
  - Cross over trial
  - Cluster RCT
- **Non-randomized**
  - Field trial (Healthy people- Vaccine trials)
  - Community Trial
  - Quasi-RCT

Contact admin
Join our group



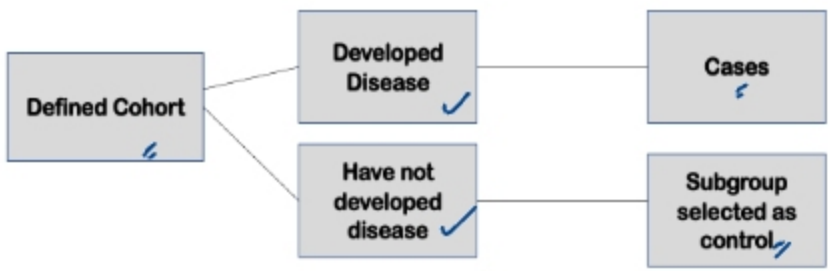
Case-control

PROSPECTIVE COHORT

time / expensive

RETROSPECTIVE COHORT

Ambispective : Prospective + Retrospective



Nested case-control

Best for multiple exposures: case-control
Best for multiple outcomes: Cohort
Best to assess natural history of disease: Cohort
Best to establish temporality: cohort
Best for rare diseases: case-control
Best for rare / expensive investigations: Nested case-control
Intention to treat:
Per-Protocol:

RCT

include pts (X) adherent

↳ Randomis° maintain

Hill's Criteria for disease causation

- **Specificity** : MOST DIFFICULT
- **Temporality**: MOST IMPORTANT
- Strength of association
- Consistency
- Biological Gradient: Dose–response relationship
- Biological Plausibility
- Coherence: Does not contradict known facts of disease
- Experiment :Removal or reduction of exposure reduces disease occurrence
- Analogy: Similar exposures cause similar effects

X Sn

EXAMPLES:

Collecting data to assess young men with Kaposi's sarcoma Case series

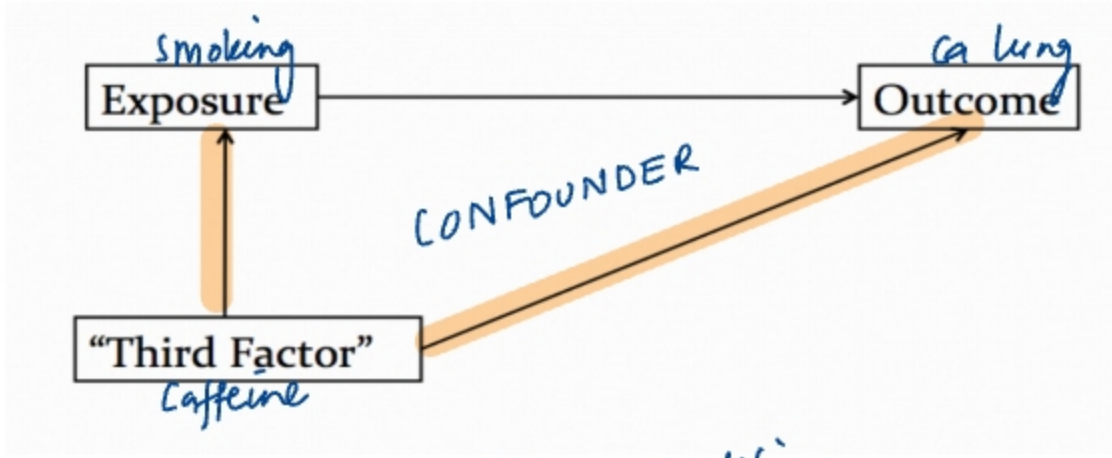
Prevalence of asthma in a particular city Cross-sectional

Measuring levels of air pollution and cancer rates in two cities Ecological

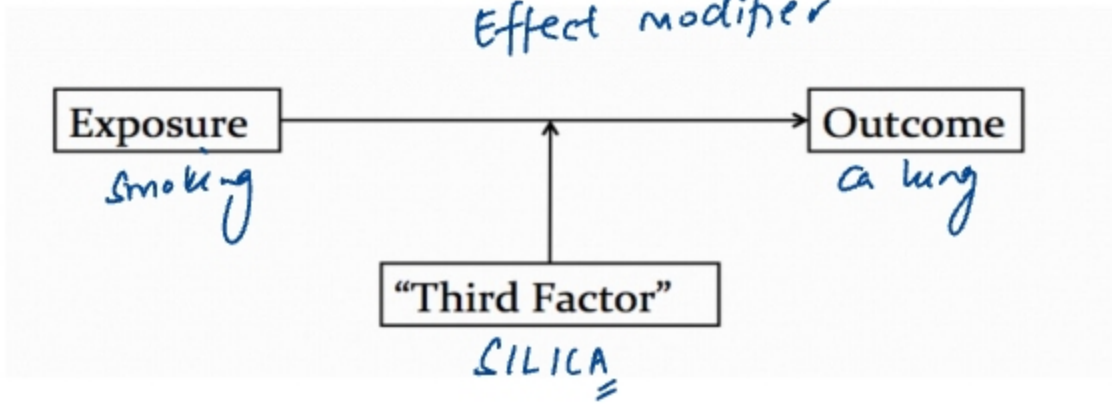
Study the use of aspirin in people who have and have not had a heart attack Case-control

To study the diseases in people who take aspirin daily and people who don't Cohort

A study involved 30,000 women who were monitored for a period of 10 years to track the occurrence of breast cancer. Among them, 1200 women developed cancer and were subsequently given a questionnaire to evaluate potential risk factors. In parallel, 2000 women from the same study served as controls and were also subjected to the questionnaire. NESTED case-control



Effect modifier



Best to eliminate known confounders: Matching QQ

Known + Unknown:

- Randomization
- Restriction
- Stratification
- Stratified randomization
- Multivariate analysis/ Statistical modelling

Overall best for confounders: Stratified randomis^

Blinding: ↓ BIAS

Single - pt x

Double - pt / dr x → (mc)

Triple - pt / dr / data analyst x - BEST

ACT — 1st-randomise + blinding + analysis

Randomisation: Known and equal chance

Removes bias + confounding

BIAS= systematic error

Selection bias - case-control

Recall bias - case-control

Berksonian bias - HOSPITAL

Attrition bias - Cohort

Hawthorne bias - ATTENTION - cohort

Pygmalion bias - RESEARCHER'S "BELIEF"

Incidence-prevalence bias=Neyman/Survival bias:

DEAD - (R) accounted for

Formula

Odds ratio = $\frac{a \times d}{b \times c}$

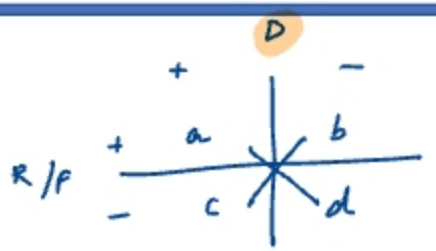
case-control

OR/RR: <1 - protective; 1 - no association; >1 - causative

0.5 - 2 xx

1 - 2 xx

1.1 - 2 ✓



Relative risk: = $\frac{I_{exp.}}{I_{non\text{-}exp.}}$

cohort

Attributable risk: $\frac{I_e - I_{ne}}{I_e}$ (75%)

proportion of disease attributed to R/F

Population attributable risk: $\frac{I_T - I_{ne}}{I_T}$ (30%)

proportional reduction in population disease if risk factor were eliminated

A study was conducted to assess the effectiveness of a new treatment for a particular disease. In the control population, there were 36 deaths/treatment failures out of a sample of 120. With the new treatment, 26 treatment failures were reported from a sample size of 130. How many patients should be treated to avert a single death?

a. 100

b. 10

c. 250

d. 160

(C) $\frac{36\ 3}{120\ 10}$ − (T) $\frac{26\ 2}{130\ 10}$ = $\frac{1}{10}$

exp

EER =(A/(A + B))

control

CER =(C/(C + D))

ARR =|CER − EER|

NNT = (1/ARR)

Screening

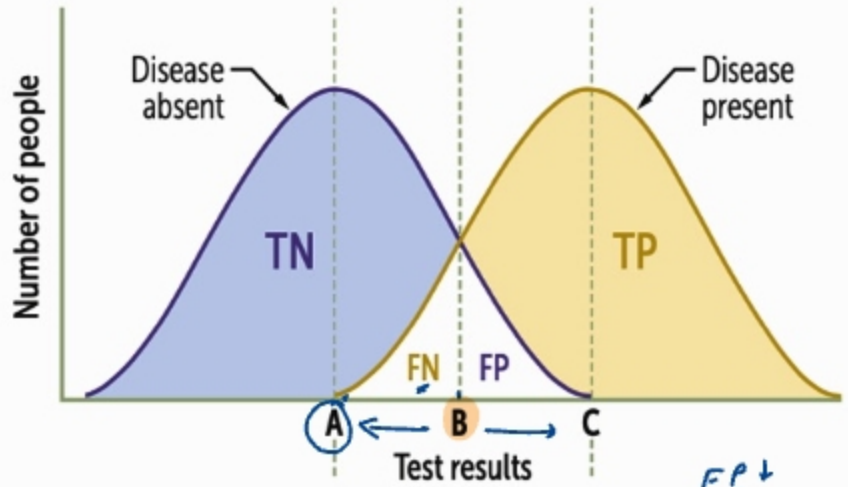
Test	Disease +	Disease −	
+	TP (a)	FP (b)	PPV = a/(a+b)
−	FN (c)	TN (d)	NPV = d/(c+d)
	Sn = a/(a+c)	Sp = d/(b+d)	Prevalance = (a+c)/(a+b+c+d)

likelihood - actually have D if test +ve

Sn ∝ 1/FN

Sp ∝ 1/FP

PPV ∝ Prevalance



FN ↓ → Sn ↑ Sp ↓ NPV ↑ PPV ↓

FP ↓ → Sn ↓ Sp ↑ NPV ↓ PPV ↑

diagnostic : ↑Sp

Screening : ↑Sn

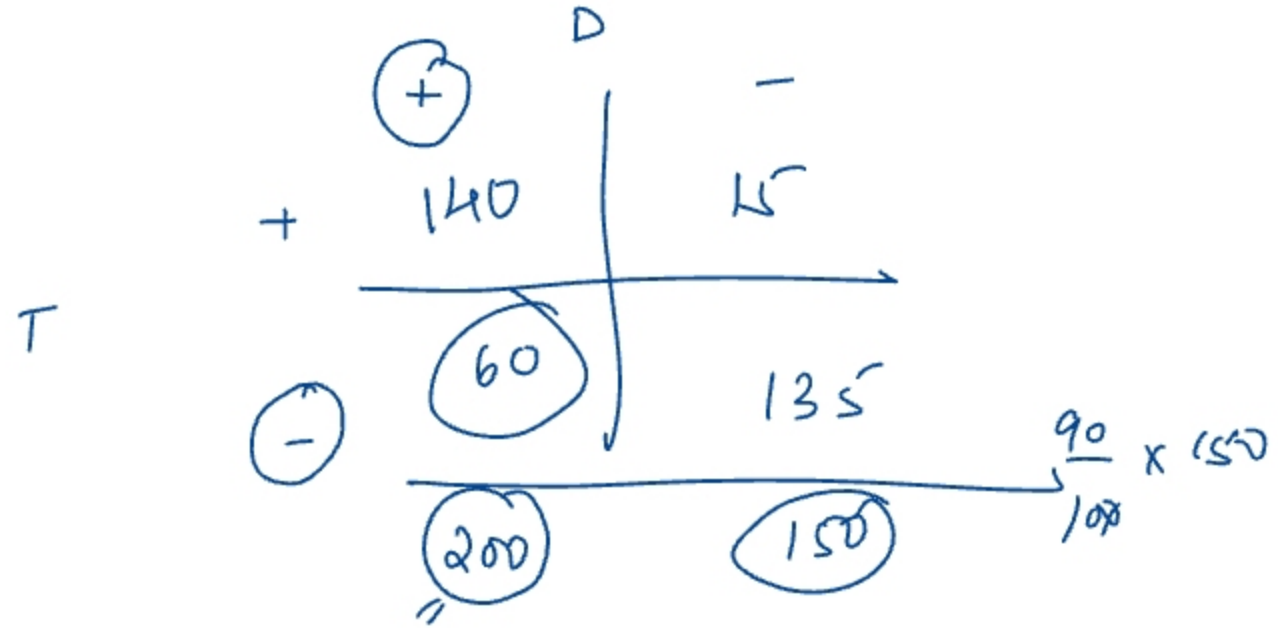
- The ability of a test to correctly identify those with the disease: Sn - RULE OUT
- The ability of a test to correctly identify those without the disease: Sp - RULE IN
- Pretest probability: Prevalance
- Post-test probability: Postive (PPV)
- Diagnostic power of a screening test: PPV
- External validity of a study is an indicator of generalizability

Criterion validity → gold std → Bland-Altman plot

	SERIES	PARALLEL
SENSITIVITY	↓	↑
SPECIFICITY	↑	↓
PPV	↑	↓
NPV	↓	↑

The World Health Organization suggests the use of a new rapid diagnostic test for the diagnosis of malaria in resource-limited settings. The new test has a sensitivity of 70% and a specificity of 90% compared to the gold standard test (blood smear). The validity of the new test is evaluated at a satellite health center by testing 200 patients with a positive blood smear and 150 patients with a negative blood smear. How many of the tested individuals are expected to have a false negative result?

A. 155
B. 15
C. 195
D. 60



Clinical trials

SWIM

pre-clinical : animal

Drug Trials	Typical Study Sample	Purpose
Phase I	Small number of healthy volunteers	"Is it Safe?" Assesses safety, toxicity, pharmacokinetics, and pharmacodynamics max tolerable dose q/
Phase II	Moderate number of patients with disease of interest	"Doses it Work?" Assesses treatment efficacy, optimal dosing, and adverse effects Max failure q/ DOSING TRIAL
Phase III	Large number of patients randomly assigned either to the treatment under investigation or to the standard of care	"Is it an Improvement over existing drug?" Compares the new treatment to the current standard of care (any improvement?). Confirm efficacy q/
Phase IV	Post-Marketing surveillance of patients after treatment	"Can it stay?" Detects rare or long-term adverse effects (e.g., black box warnings)

NDA

Phase 0: lethal/expensive - u dosing → 1/100th / <100 ug OR

Mandatory

Types of Data

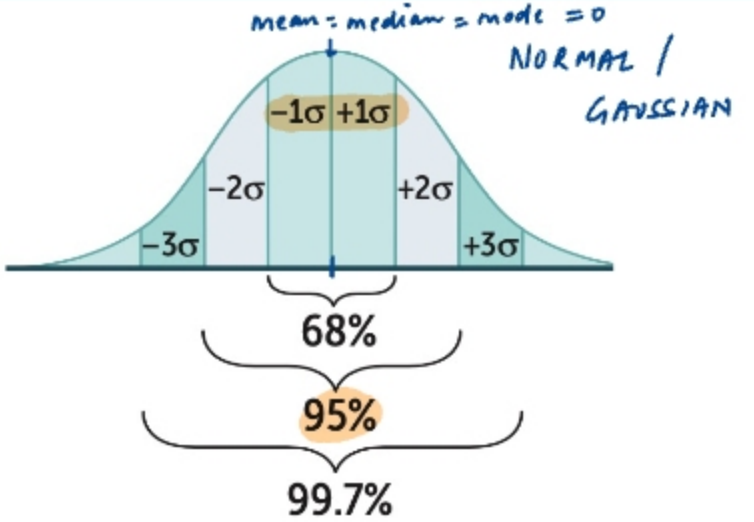
NO IR

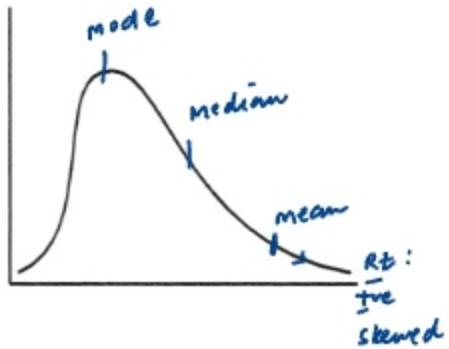
	Order	Meaningful interval
Qualitative : Nominal Male/female, black/white, urban/suburban/rural, and A/B/O	x	x
ordinal TNM staging, Likert scale, Guttman scale, VAS	✓✓	x x
Quantitative : Temperature scale °C/°F Interval	✓✓	✓✓ (true zero)
Weight, blood pressure, pulse rate, Sugar, Hb, BMI Ratio	✓✓	✓✓

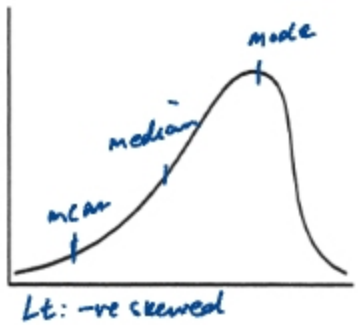
Measures

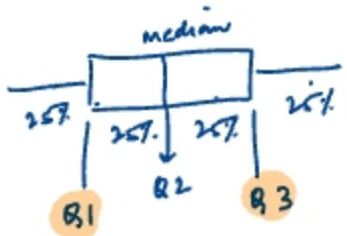
+1SD = 34%.

Measures of Location or Central Tendency	**Mean, median, mode** 1, 2, 2, 3, 500 -Best measure of central tendency overall: Mean -Best for nominal data: MODE -Best for ordinal data: Median -Best for metric data: Mean -Most affected in skewed data: mean -Least affected in skewed data: mode -Most useful measure for skewed data: median -50th centile: Median **Mode = 3(median) – 2 (mean)**
Measures of Dispersion or Variability or Spread	• Standard deviation RMSD. SD $\sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$ • Variance = $(SD)^2$ • Range • Interquartile range (Q3 – Q1)
Measures of Position	• Percentiles, quartiles, centiles, decile • Z-score: $\frac{x-\bar{x}}{SD}$









(N) Box-whisker

Kurtosis: skewness

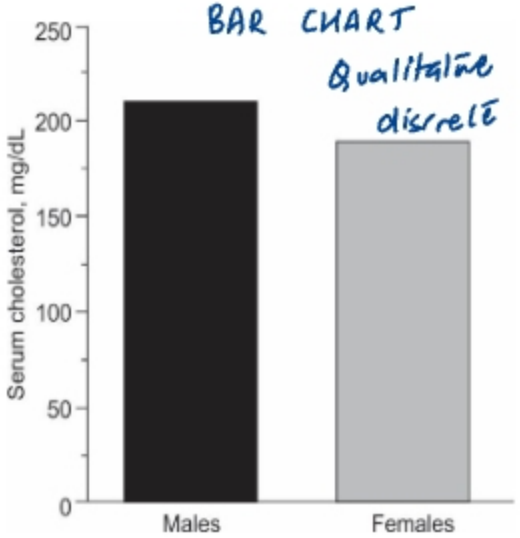
Normalcy: Plot histogram, Box-whisker, Shapiro wilk, Kolmogorov-Smirnov a/

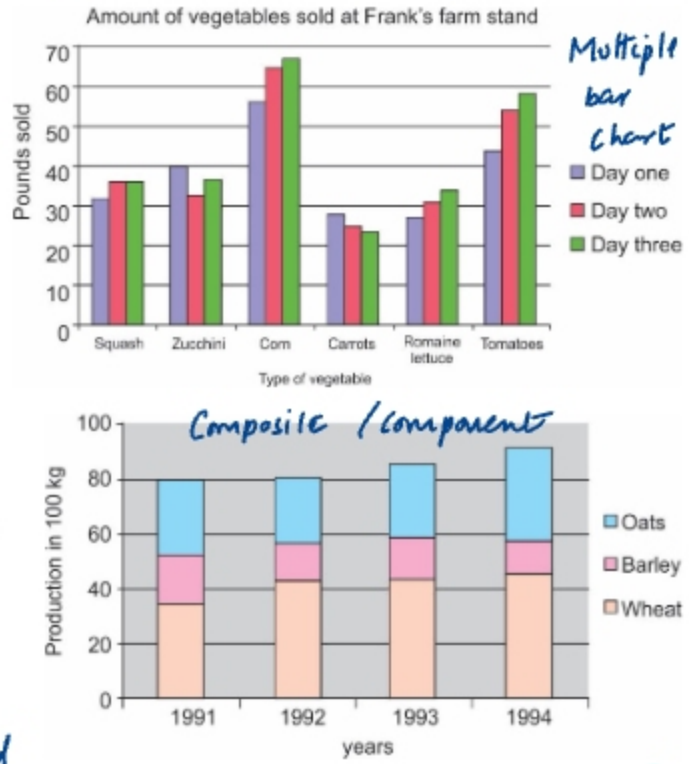
In a public health survey conducted in rural Odisha, a 36-year-old woman is found to have a hemoglobin (Hb) level of 15.0 g/dl. This finding is particularly noteworthy as the survey data shows that the mean Hb level among the women in this area is 13.5 g/dl, with a standard deviation of 1.5 g/dl. To contextualize the woman's Hb level within the study's data, the researcher uses the concept of Z-scores. Based on this information, what is the Z-score for this woman's hemoglobin level?

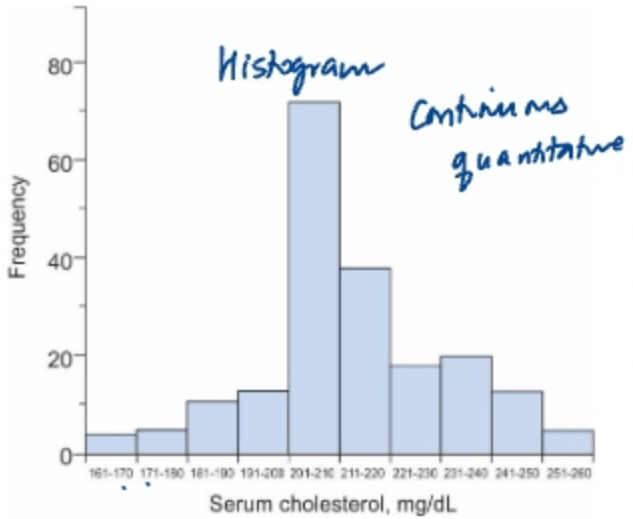
A) 1.0
B) 1.5
C) 2.0
D) 0.5

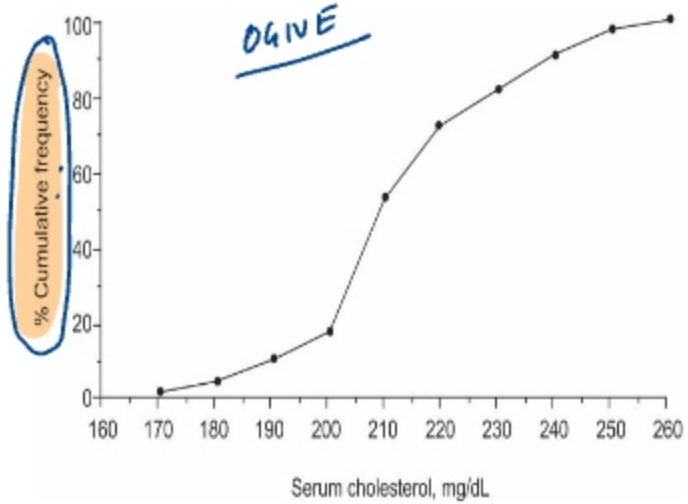
$$\frac{15 - 13.5}{1.5} = +1$$

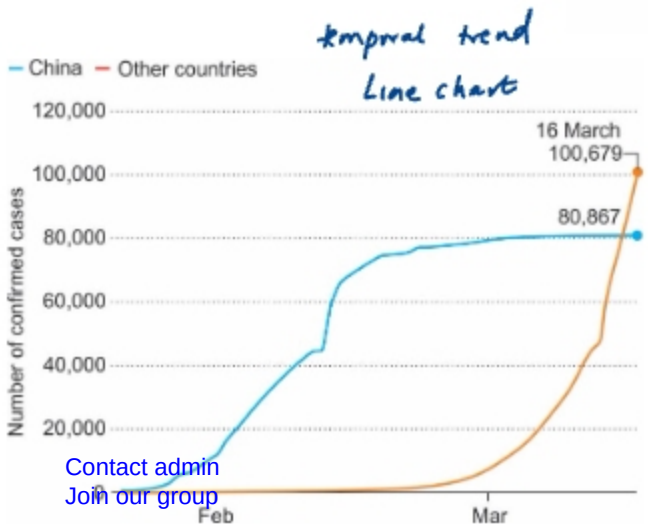
Graphical representation

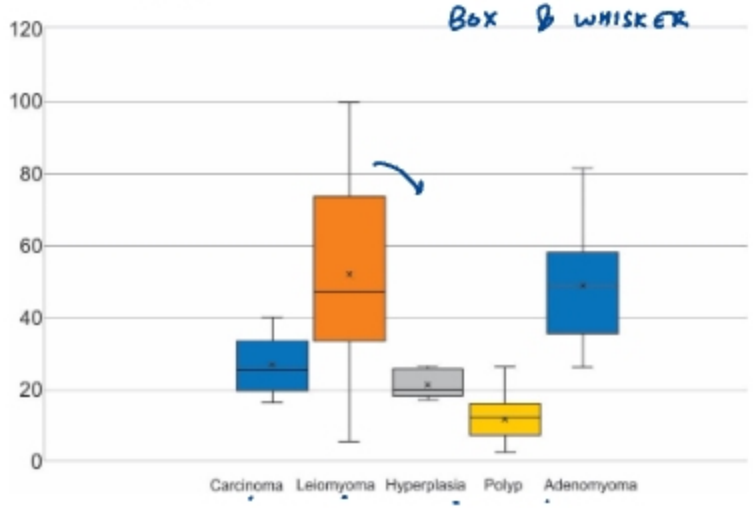


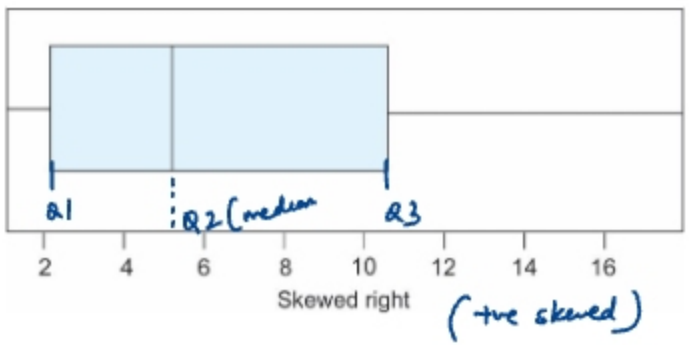




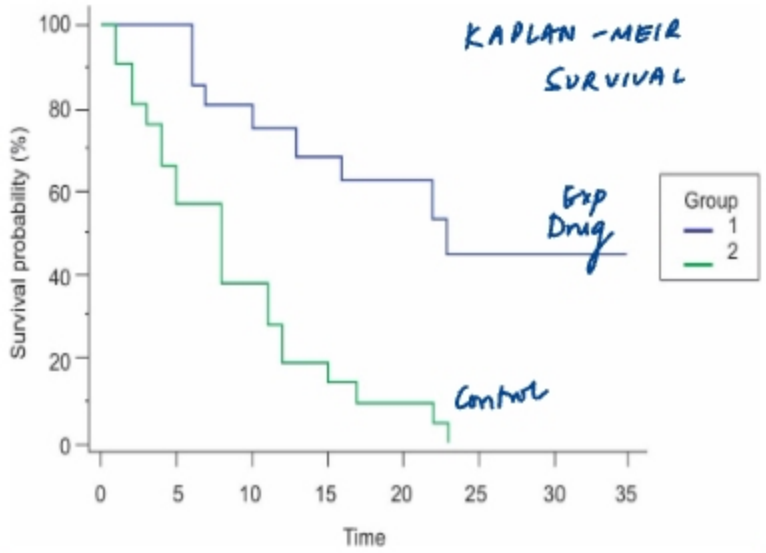






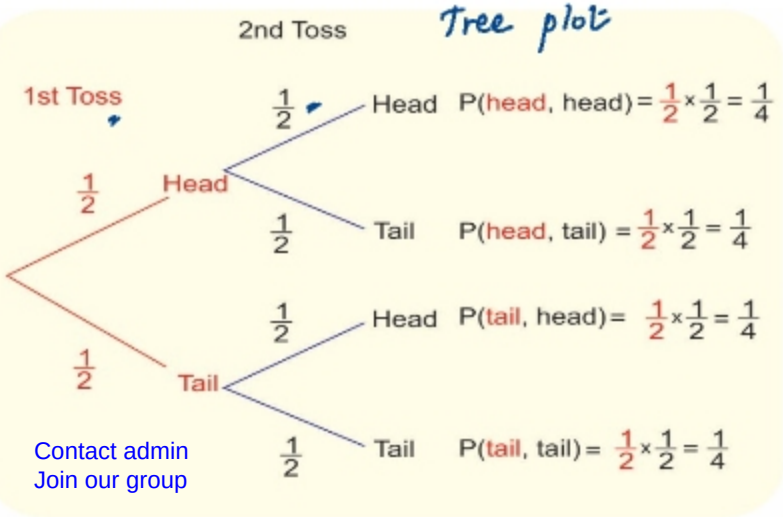


Graphical representation

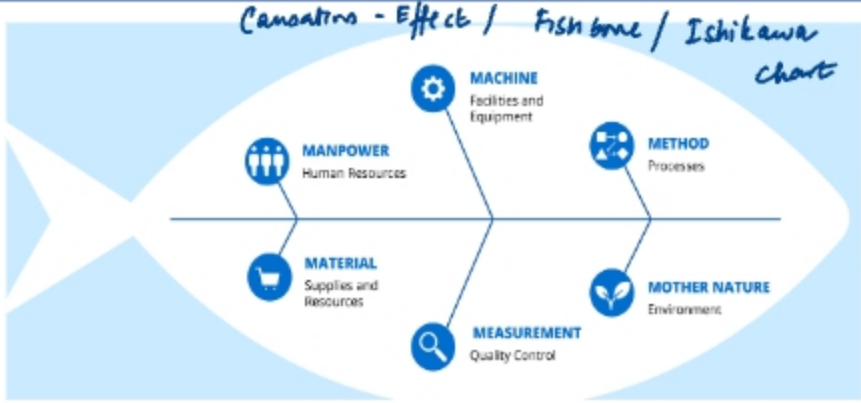


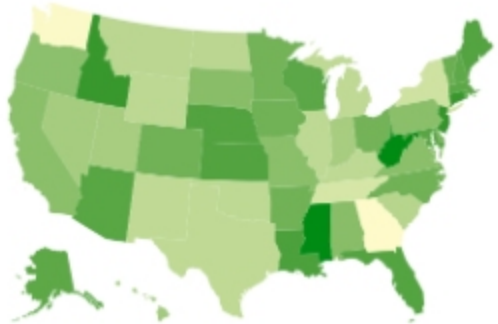
Log rank test or Cox regression
Hall-wellner band

QQ



Contact admin
Join our group

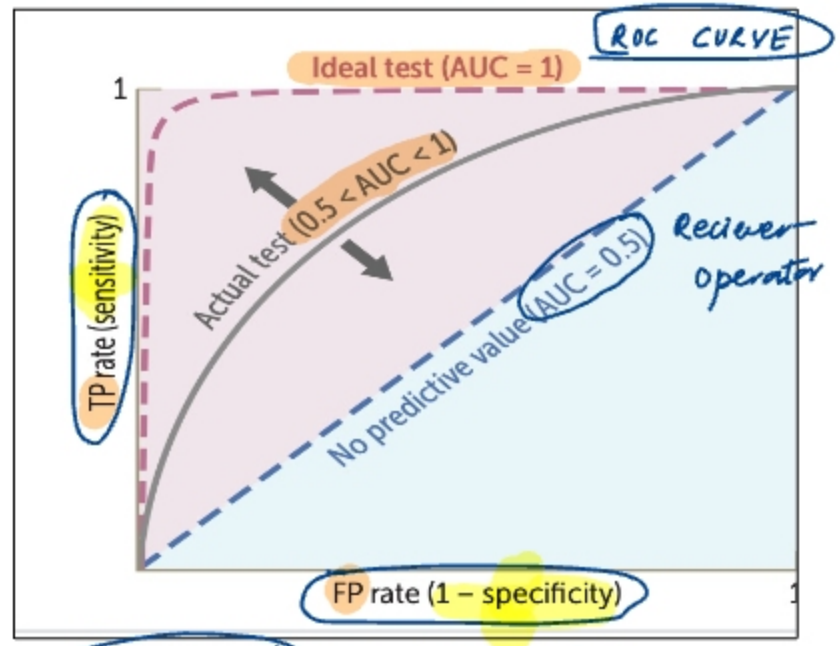




Choropeth & geographical distrib"

Stem	Leaf
0	9
1	2, 8, 3, 9, 5
2	0, 3, 9, 2
3	9, 8, 2, 5, 7, 8, 8
4	9, 3, 2, 6
5	8, 9, 0, 3, 5
6	6, 7, 5
7	1

00, 01, 12, 14, 16



optimal cut-off → AUC maximum

Youden index J = Sn + Sp − 1

LR + = Sn / (1 − Sp)

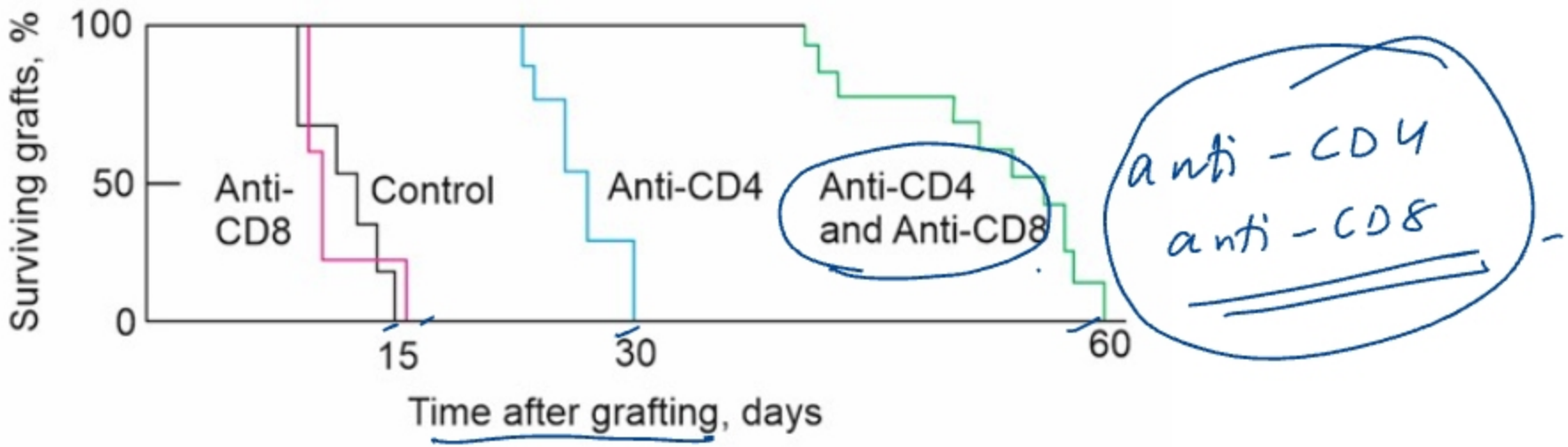
15 pregnant lady is 15x likely to get a true

LR − = (1 − Sn) / Sp

POISSON DISTRIBUTION

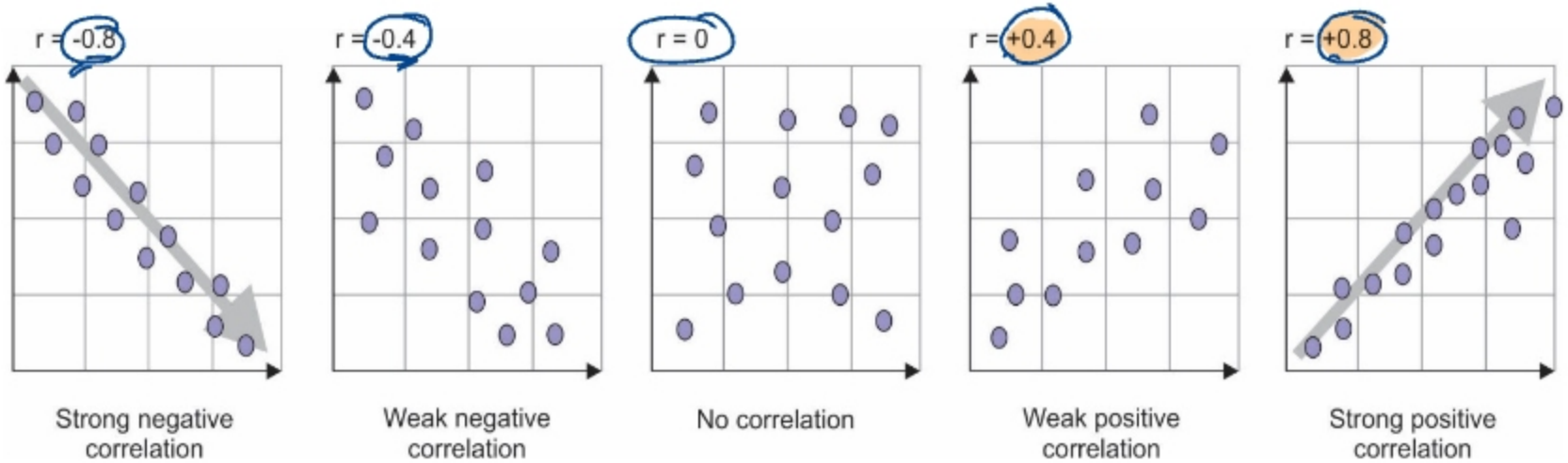
Probability distribution that is used to show how many times an event is likely to occur over a specified period:

For the given Kaplan-Meier curve on the role of T-cells in the allograft rejection process, true statement is: (INICET MAY 2024)



A. Only CD4 contributed to graft rejection significantly
B. Only CD8 contributed to graft rejection significantly
C. Both CD4 and CD8 protected against graft rejection significantly
D. Both CD4 and CD8 contributed to graft rejection significantly

Miscellaneous



SCATTER PLOT - Pearson correlation coefficient (r) 0 - 1 — (+)/(−)
weakest strongest
↳ 2 independent variables
coefficient of determination = (r^2)

REGRESSION formulae:

$y = a + bx$ — Simple Linear (y (dep), x (indepen))

$y = a + b_1x_1 + b_2x_2 + \cdots + b_nx_n$ - multiple linear

$y=a+bx+cx^2$ curvilinear

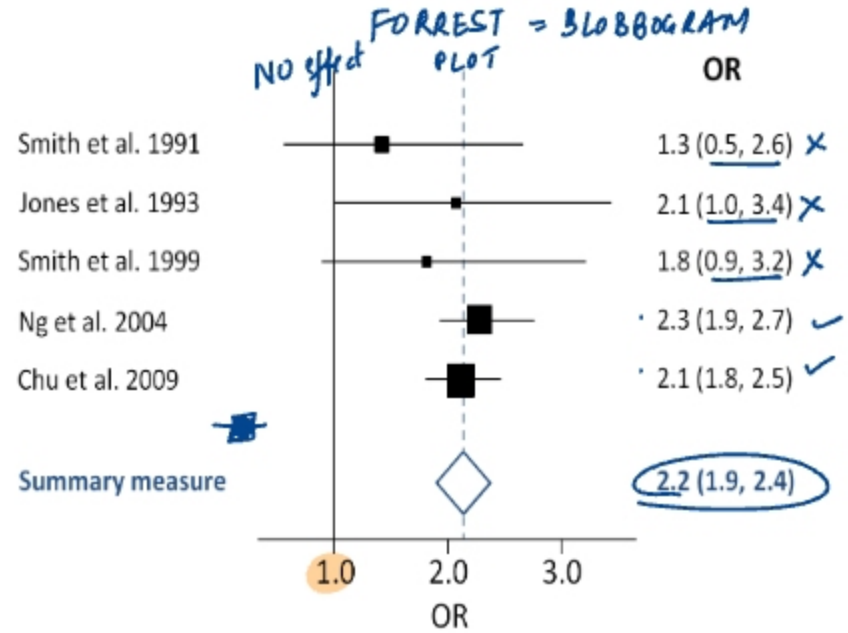
Logarithmic: (log) → Logistic regression

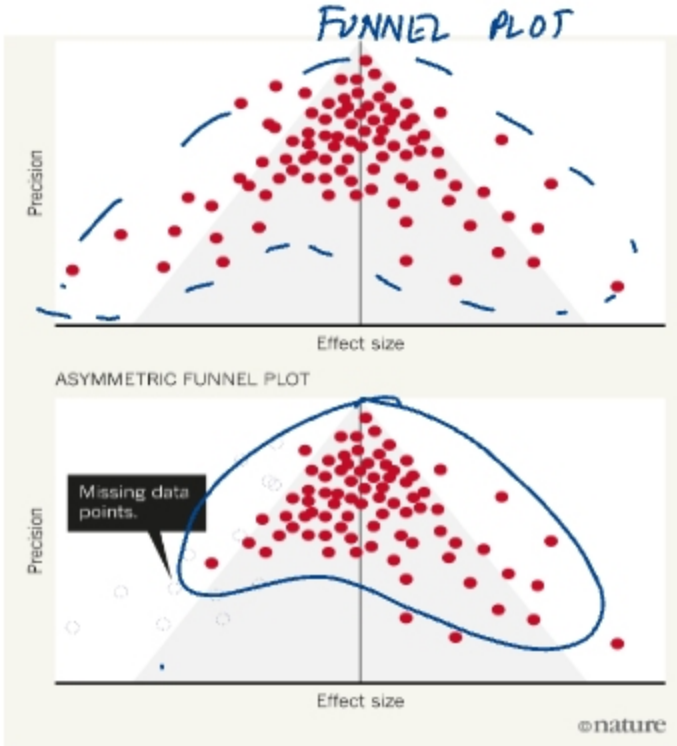
Kappa Statistics
Used to check the level of agreement between observers

$k = \frac{\text{observed} - \text{expected agreement}}{1 - \text{expected agreement}}$

Cohen's Kappa	Interpretation
0.10 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80 (>0.7)	Substantial agreement QQ
0.81 – 0.99	Near-perfect agreement
1	Perfect agreement

Evidence-based Medicine (Father: David Sackett)

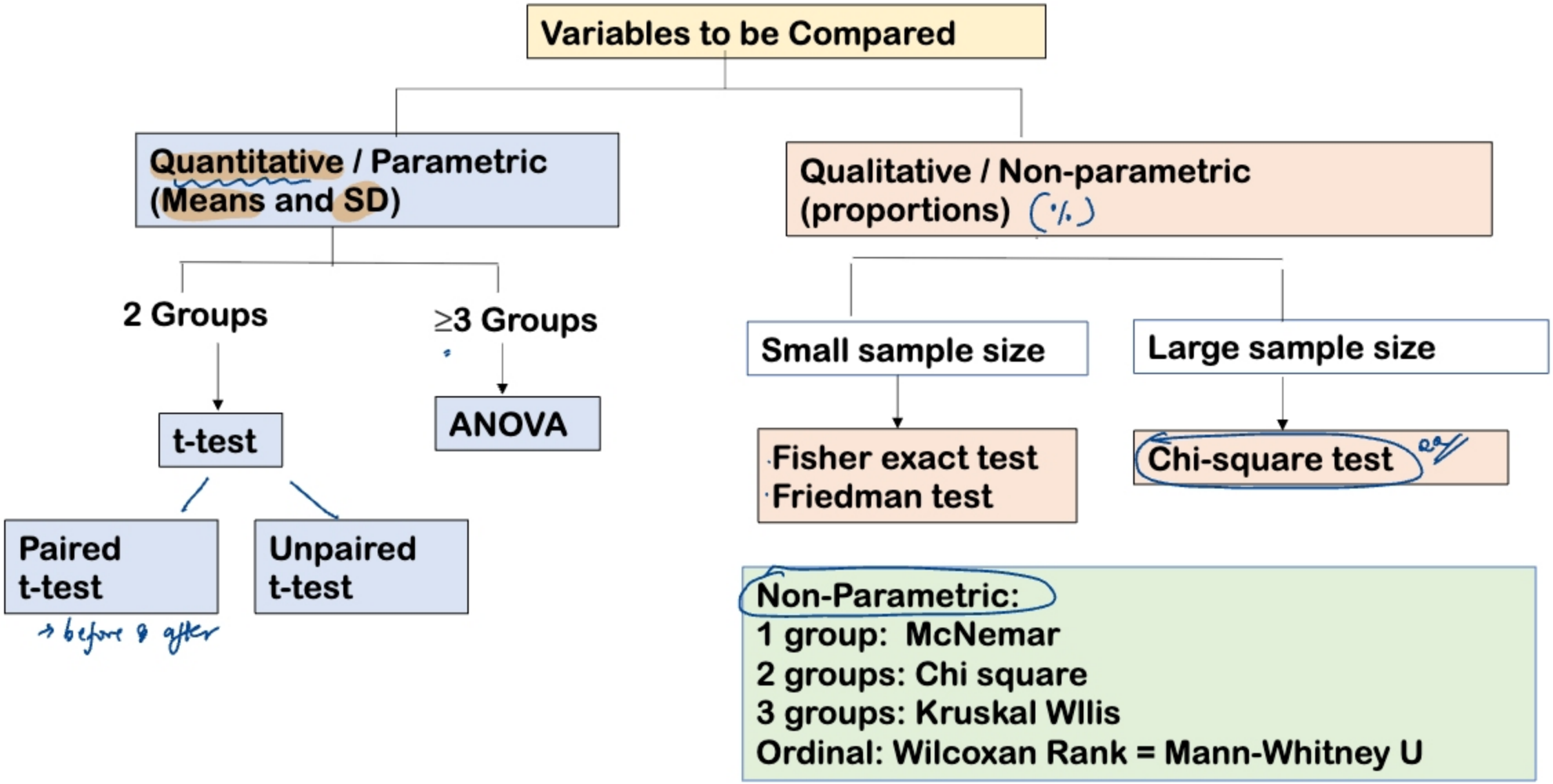




Meta-Analysis:
MOOSE/ QUOROM/ COCHRANE
PRISMA: Systematic reviews
Identification
Selection
Abstraction
Analysis
No randomisation

Apples and oranges - drawback of MA
File drawer effect - drawback
↳ Publication bias

Tests of significance



Compare BNP levels in people w/ HF and w/o HF — t-test

Compare BNP levels in people w/ HF before and after treatment w/ an ACE inhibitor — Paired t-test

Comparing BNP levels in people w/out HF, people w/ L-sided HF, and people w/ R-sided HF — ANOVA

Comparing the proportion of people w/out HF, people w/ L-sided HF, and people w/ R-sided HF that have high cholesterol — Chi SQUARE

Alpha and beta errors

Null Hypothesis (H_0)

	H_0 true (TRUE)	H_0 false (FALSE)
Reject H_0	Type I error	Correct decision
Accept H_0	Correct decision	Type II error

False positive: α (αFP) False negative: β

More dangerous error: type I / α

ALPHA ERROR / p value: < 5% → "CHANCE" $p < 0.05$ → statistically significant

Confidence level : 1-p > 95%

Power of study: β error (1-β)

Higher Power: Increase sample size, precision (↓β)

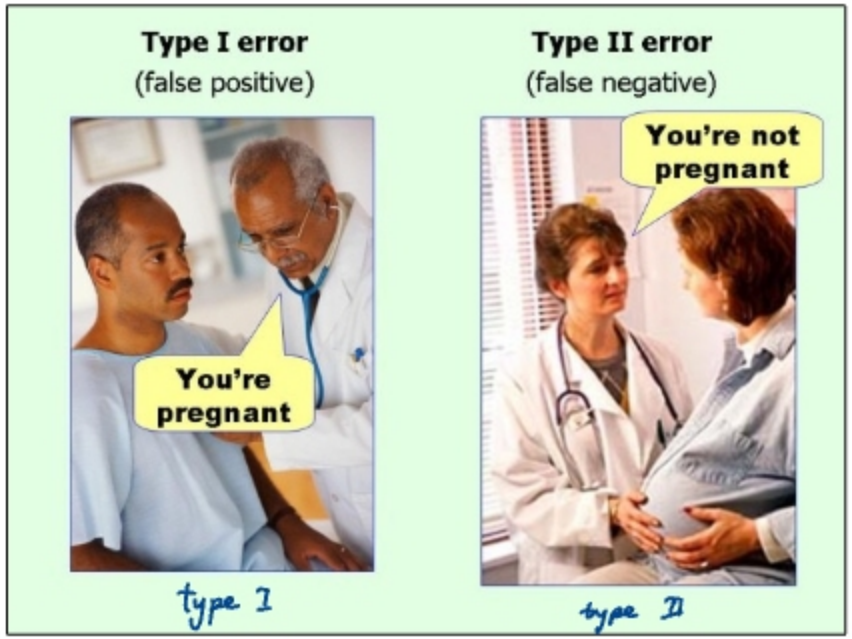
Q. A study finds no significant association between two variable but truly there exists a difference. What type of error is this? (BAD / GOOD)

A. Type I error

B. Type II error ✓

C. Random error

D. Systematic error



Precision vs Accuracy

Coefficient of variation = $\frac{SD}{mean} \times 100$

- 12 ± 2
- 10 ± 3

SAMPLE SIZE : $\frac{4pq}{d^2}$ d = allowable error (5%) $\frac{4 \times 80 \times 2}{5 \times 5}$

Confidence interval: mean ± 2 SE

Standard error of mean: $SE = SD/\sqrt{n}$

Standard error of proportion: $\sqrt{pq/n}$

Precision: repeatability / reproducibility

Precision ↑ Standard error ↓ (n↑) Power (↑)

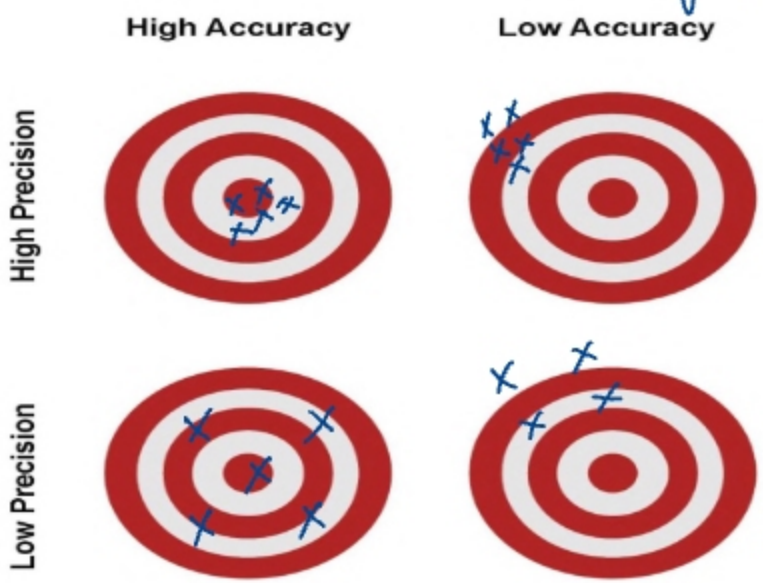
True value= Measured + Random error + Systematic error

Random error: Precision ↓

Accuracy: close to actual value

Bias: Systematic error → ↓ Accuracy

- 140 ± 2 (SE ↓, n↑) → narrower CI → ↑precision
- 120 ± 20 → −precision



A study was conducted to find the average intraocular pressure (IOP). IOP in 400 people was measured, and the mean was found to be 25 mmHg with a standard deviation of 10 mmHg.
What is the range in which the IOP of the population (95% confidence interval) would fall?

A. 24–26 mmHg
B. 22–28 mmHg
C. 20–30 mmHg
D. 23–27 mmHg

mean ± 2SE

25

$SE = \frac{SD}{\sqrt{n}} = \frac{10}{\sqrt{400}} = \frac{10}{20} = 0.5$

What will be the 95% confidence interval (CI) for an estimated prevalence of 10% and a sample size of 100?

A. 2–18
B. 4–16
C. 7–13
D. Given data inadequate for calculation of class intervals

$\sqrt{\frac{pq}{n}} \quad \sqrt{\frac{10 \times 90}{100}}$

3

mean ± 2SE

10 ± 6

A study was conducted on two different samples for comparing variation between DBP and Vitamin D. The mean diastolic blood pressure is 110 with standard deviation 11 and the mean vitamin D level is 18 with standard deviation 3. Which of the following statement is true regarding the coefficient of variation (CV)?

A. CV of DBP is more than Vitamin D
B. CV of Vitamin D is more than DBP
C. Both DBP and Vitamin D have equal variability
D. It cannot be ascertained from information provided

BP 110 ± 11

vit D 18 ± 3

11/110 × 100 10%.

3/18 × 100 16%.

A researcher is examining the relationship between socioeconomic status and IQ scores. The IQ scores of young Indian adults have historically been reported to be distributed normally with a mean of 100 and a standard deviation of 15. Initially, the researcher obtains a random sampling of 300 high school students from public schools nationwide and conducts IQ tests on all participants. Recently, the researcher received additional funding to enable an increase in sample size to 2,000 participants. Assuming that all other study conditions are held constant, which of the following is most likely to occur as a result of this additional funding?

A. Increase in range of the confidence interval
B. Decrease in standard deviation
C. Decrease in standard error of the mean
D. Increase in risk of systematic error

n ↑ → Power ↑

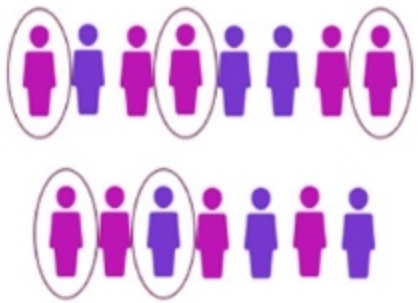
$SE = \frac{SD}{\sqrt{n}}$

SE ↓ → precision ↑

CI = narrower

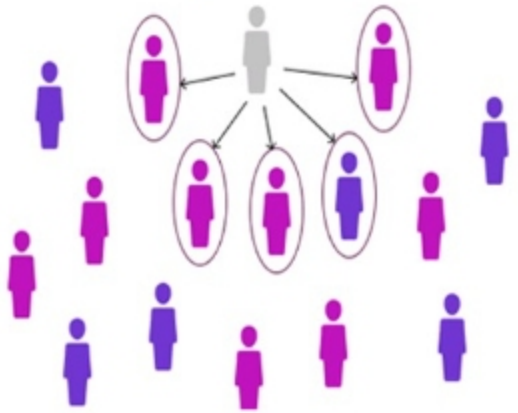
Sampling

Simple randomised

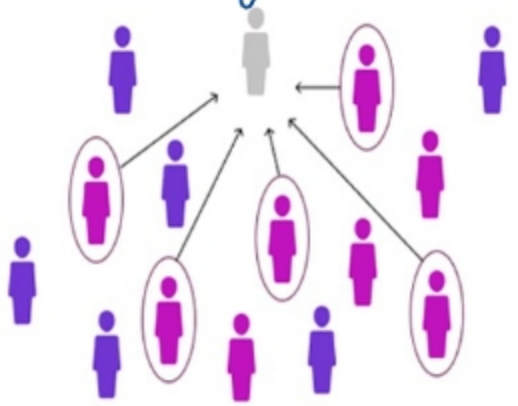


Systematic random

Convenience

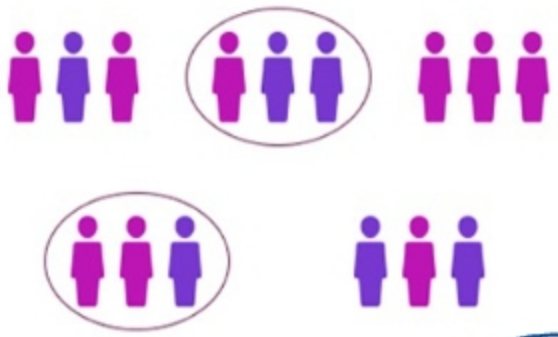


voluntary response



Stratified random

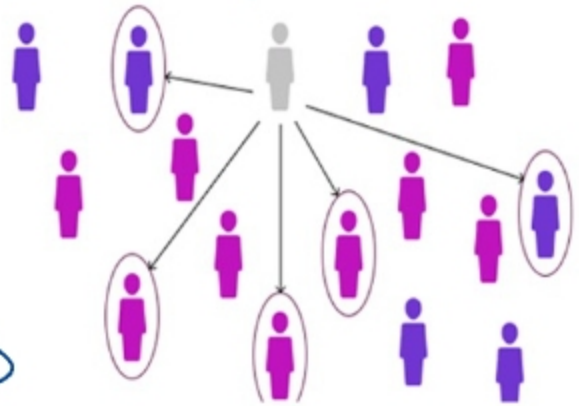
CLUSTER SAMPLING



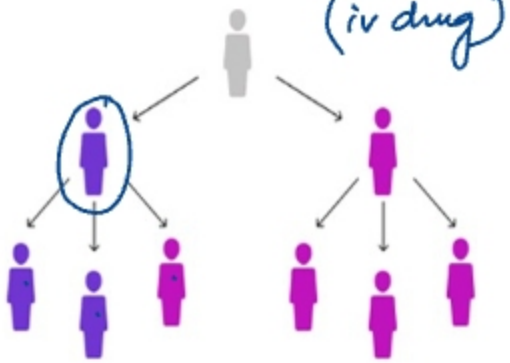
30 clusters x 7 children = 12-23mos

DESIGN EFFECT

JUDGEMENT



SNOWBALLING (iv drug)



Infectious diseases epidemiology

Direct transmission:
Droplet transmission
Vertical
Inoculation on skin / mucosa
Contact with soil

Indirect transmission
Fomite-borne (non-living objects)
Airborne/ droplet nuclei (1-10u)
TB, influenza, Chickenpox, Measles, COVID-19
Food-borne
Blood-borne
Vector-borne

Types of Transmission in Vectors
1. Propagative
Example: Plague bacilli in rat fleas, YF in Aedes
2. Cyclo-propagative
•Example: Malarial parasites in Anopheles
3. Cyclo-developmental
•Example: Microfilaria in Culex
4. Transovarial
•Example: Rickettsia rickettsii in ticks, Mite in scrub typhus
5. Transstadial
•Example: Borrelia burgdorferi, Indian tick typhus in ticks.

Anthropozoonoses: Rabies, plague, hydatid
Zooanthroponoses: TB to cattle
Amphixenosis: T.cruzi, S.japonicum

Person, animal, object, from which an infectious agent passes or is disseminated to the host:
Person, animal, plant, soil, in which the organism metabolizes and replicates:
Examples:
Hookworm infection: Reservoir – man; Source– soil contaminated with infective larvae
Tetanus: Reservoir and source – soil
Typhoid fever: Reservoir – case or carrier; Source of infection – faeces or urine of patients

Disease	Incubation period	Duration of Isolation	Communicable periods
Chickenpox / Herpes zoster	10-21d	6 days after onset of rash / until lesions are crusted	2 days before to 5 days after appearance of rash
Measles	8-14d	From onset of catarrhal stage to 5 days after rash onset	4 days before to 5 days after appearance of rash
Diphtheria	2-5d	Until 48 hours after starting antibiotics	Up to 4 weeks after disease onset
Cholera	2d	3 days after starting tetracyclines	

- **Endemic:** constant level
- **Hyper-endemic:** ↑↑ levels – all age gp
- **Holo-endemic:** children ↑↑

- **Control** – burden ↓↓
- **Elimination** – ↓↓ – local transmission interrupted
- **Eradication** = GLOBAL – organism ex

Eliminated :

Guinea worm: 2000
Leprosy: 2005 1/10000
Yaws: 2016
NT: 2016
Trachoma: 2024

SMALL POX
8 may 1980

NATIONAL POLIO SURVEILLANCE

P1- mc epidemics
P2- VDPV / easily killed
P3- VAPP
OPV switch- tOPV → bOPV (2016)
VDPV: vaccine derived polio virus – vaccine virulent
VAPP: vacc ass paralytic polio (immune-abernant)

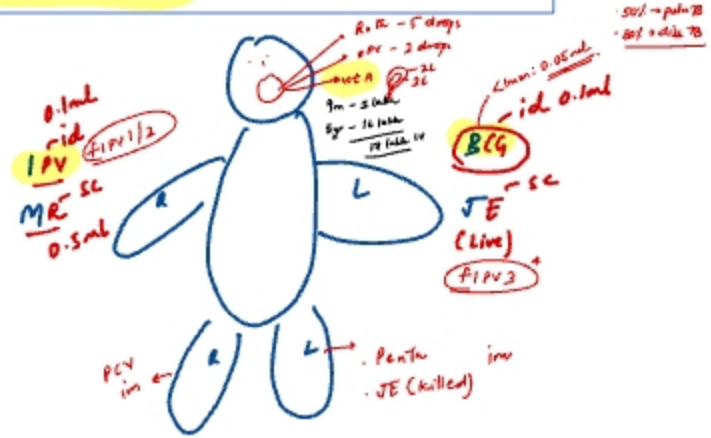
AFP surveillance: SMO
<15yrs with AFP
2 stool samples 24hrs apart <14d of AFP
Reverse cold chain (2-8°C) Elimination of FMC
Reach lab in 72hrs
Residual paralysis check: 60d
Indicators:
> 1 AFP/lakh/year in age < 15 years
Adequate stool sample, residual paralysis check :
↓ > 80%. ↑ > 80%.

NIS

Age	Vaccination Schedule
At birth	BCG, OPV-0 (Within 15d), Hepatitis B-0 (Within 24hrs)
6 weeks	OPV-1, Rota-1, Pentavalent-1, fIPV-1, PCV-1
10 weeks	OPV-2, Rota-2, Pentavalent-2
14 weeks	OPV-3, Rota-3, Pentavalent-3, fIPV-2, PCV-2
9 months	Measles/MR-1, Vitamin A, PCV booster, fIPV-3, JE-1
16–24 months	Measles/MR-2, DPT 1st booster, OPV booster, JE-2
5–6 years	DPT 2nd booster
10 & 16 years	Td

Fully immunized child : 1yr (Assessed at 12-23mon)
Completely immunized child: 2yrs (Assessed at 5yrs)

Vaccine man: IM BJ



eVIN
ELECTRONIC VACCINE INTELLIGENCE NETWORK
stocks

U-WIN
UWIN App Simplifies Vaccination Tracking
0-5yr.

DELAYED IMMUNISATION:
- BCG/ HEP B/ IPV/ ROTA/ PENTA/ PCV → 1yr
- MR/ VIT A/ OPV - 5yr
- Hib - 6yr
- DTP - 7yr
- JE - 15yr (now: 2yr)
- dT/TT - any age.

Oral
Intradermal
Intramuscular
Pentavalent

SAFE-VAC – AEFI
KILKARI - audio msg - awareness

Ig should not be given with vaccine except: Hep B / TT

VACCINES

OPEN VIAL POLICY: 28days
Not applicable: MBJ / COVID/ YF

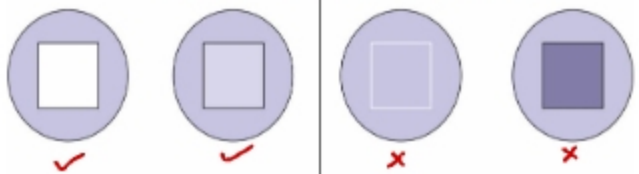
MR | BCG | JE (Live) | —
Diluents: DW | NS | PBS | NS

Day carrier: village - 6 vials
Vaccine carrier: S/C (2-8°C) (−15°C) ice packs - 16-20 vials
Small ILR/DF (1mon): PHC
Needs electricity: 8hrs
District: Large ILR/ DF (1mon)
State/ Regional: WIC/ WIF (3mon) (2-8°C) (−15°C) ice packs OPV

AEFI: (abs CI - anaphylaxis)
Neurological deficient (progressive) - DPT ✗→ DaPT / DT
Unconsolable cry/ HHE - (✗) CI - DPT / DaPT
TSS/ Thrombocytopenia - MR
Neomycin - MR
GBS - Influenza (killed)
Intussusception - Rotavirus
Egg allergy - YF / influenza
Immunodeficiency: LIVE CI except ✓ Complement deficiency

DPT:
Preservative: Thiomersal
Adjuvant: $Al(OH)_3$ ↑immunogenicity

VVM : cold chain (2-8°C)



✓ ✓ x x

Indicator : p-toluene SO_4 / diacetylene - square
Potency (indirect) ≈ · Exp date xx
· Efficacy xx
Discard point
VVM 2/7/14/30

HEAT-SN : rBCG > OPV > MR

FREEZE SN → SHAKE TEST
↳ Hep B > DPT

- DIAL THERMOMETER
- MO - PHC
- twice a day

LIVE ATTENUATED

BCG (Danish 1331) M.bovis

MMR (Edmonston-Zagreb, Jerryl-Lynn, RA 27/3) Measles Mumps Rubella

Rotovac (Rotarix-mono, Rotateq-penta)

JE : SA 14-14-2 (LIVE)

Typhoral-Ty21a (>6y, D1,3,5,7)

Varicella (Within 5d of exposure) OKA STRAIN

OPV (Sabin)

Yellow fever: 17D (↓preg) → protection - start after 10d
↳ Lifetime VALID

Influenza

KILLED: Need multiple doses, adjuvants

Rabies

Cholera-Dukoral dl/bi >2yrs (Cholera O1+ B subunit + bicarbonate buffer)

Shanchol, mORCVAX >1yr (Cholera O1,139)

Pertussis

JE-Nakayama Beijing/ Indian Kolar (JENVAC)

IPV (Salk)

Toxoid-DT

Recombinant DNA-Hep B

POLYSACCHARIDE: SUBUNIT. SHIVANI

Pneumococcal < PPSV 23 / PCV 13

Hib

Meningococcal-ACWY (xB subunit)

Typhoid Vi (>2y, 1 dose with booster);

TCV (>6mon; 1 dose) → Health care worker

PCV
TCV (Conjugate) + prot (Tcommuno)

COVID-19 vaccines

Chimpanzee adenavirus 1 vector

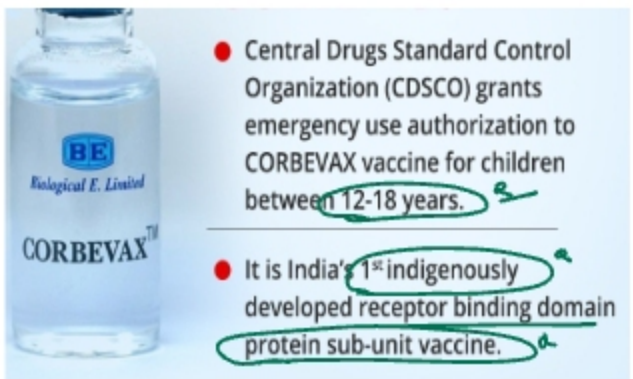
oxford trial 2

≥ 18yrs.

BBI52

killed

≥ 15yrs

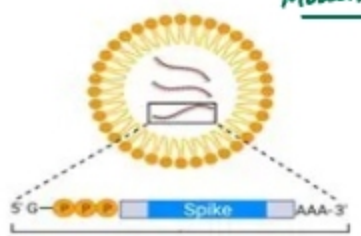


- Central Drugs Standard Control Organization (CDSCO) grants emergency use authorization to CORBEVAX vaccine for children between 12-18 years.
- It is India's 1st indigenously developed receptor binding domain protein sub-unit vaccine.

INTRANASAL

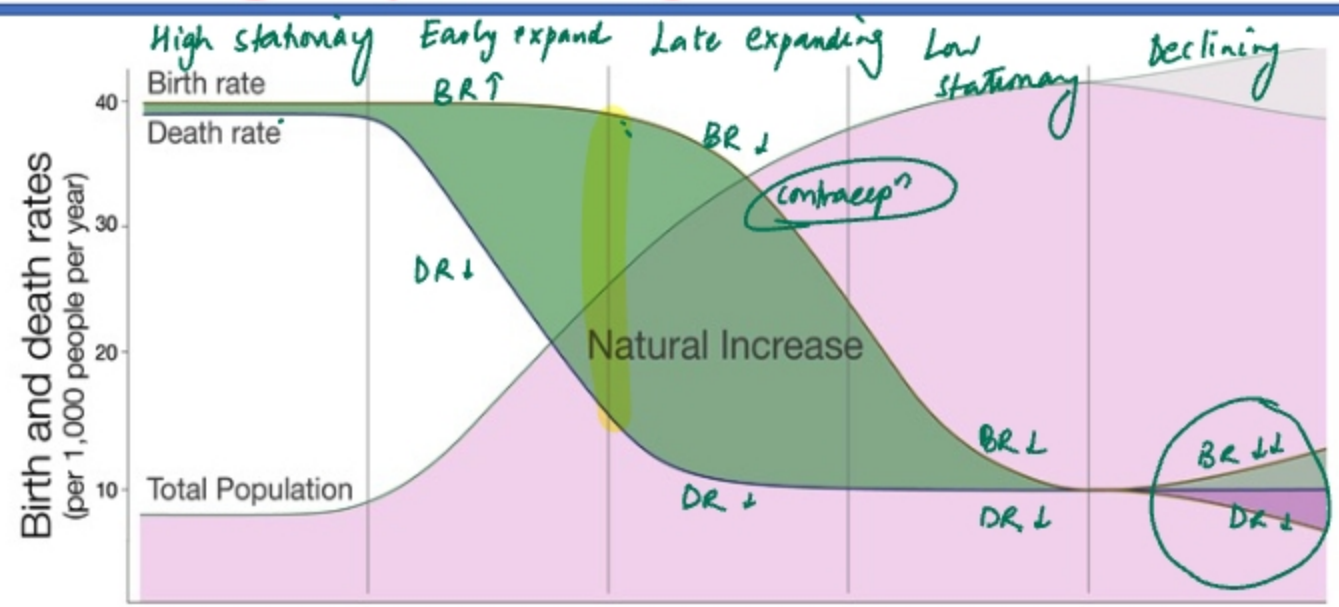
BioNTech/Pfizer

Moderna

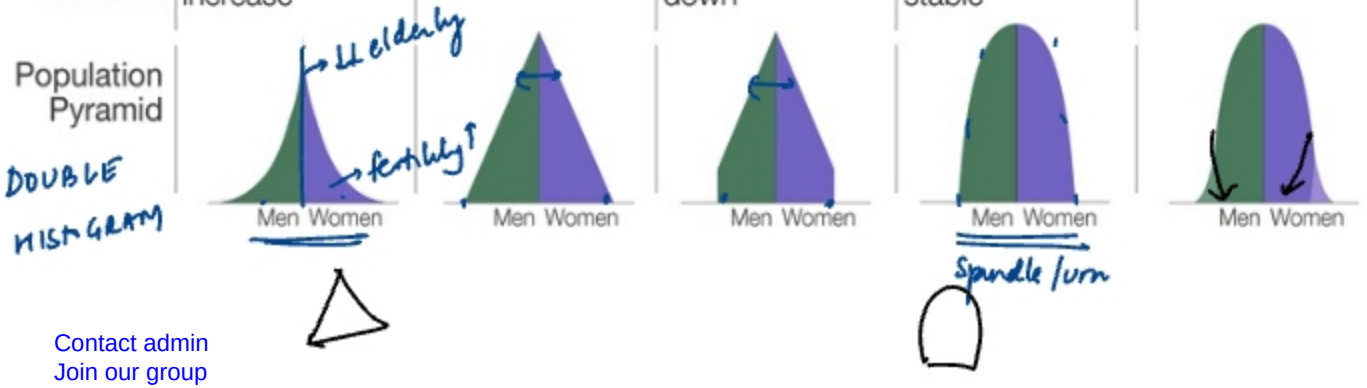


Platform: lipid nanoparticle-encapsulated mRNA vaccines encoding Spike protein

Demographic cycle



	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Birth rate	High	High	Falling	Low	Yet to be seen (Possibly falling further, possibly rising again)
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Rapid increase	Increase slows down	Falling and then stable	Little change
Population Pyramid					



Demographic gap: BR − DR

Max DG: st 2 **Min DG:** 5 > 1/4

Demographic transition: (-ve) st 1 → st 4

Demographic trap: TWO (↑↑elderly ↑↑children)

Demographic gift/dividend/bonus: 3 / 4 (↓BR ↓DR) = youth economy

India, China: 3 (4) **Japan, Norway:** 5

Developing: 2 **Developed:** 4

Ideal: 4

Demography

World Popn Day – 11 July

MYP – 1st July

Demographic determinants:

Birth Death Marriage Migration Social mobility

Survey systems:

Census – 10yrly

Last: 2011 (Next: 2026)

DeFacto: as and where one is

Dejure: Jurisdiction

SRS (Home Affairs): every 6monthly – publn annually

CBR, CDR, MMR, IMR, Sex ratios, Literacy

DUAL LEVEL: state / central

NFHS (MoHFW)

Last: 2019-2020 (5yrly)

Civil registration system (Home Affairs):

Birth/death: Tin 21d

Hospital Family

Eligible Couple: ♀ repr age grp → Contracepn

Target couple: ≥1 live child → Steriln

Contact admin

Join our group

CBR (18.4/1000): $\frac{\text{no. of births}}{\text{MYP}} \times 1000$

CDR (6.4/1000): $\frac{\text{no. of deaths}}{\text{MYP}} \times 1000$

Annual growth rate: $\frac{CBR - CDR}{10}$

Malthusian model:

1%- 70yrs 2%- 35yrs

Dependency ratio: $\frac{\leq 14 + \geq 65\text{yrs}}{15-64\text{yrs}}$

Literacy rate = $\frac{\geq 7\text{yrs} + \text{read/write/understand}}{\text{total popn} \geq 7\text{yrs}}$

Sex ratio ♀/♂

Child sex ratio $\frac{0\text{-}6\text{y} ♀}{0\text{-}6\text{y} ♂}$

No of live births in an area: 100

No of BCG vaccines? 200

No of pregnant females? (10%) 110

Min no of ANC registered? 55 (50%)

Wastage factor: BCG – 2; MR – 1.3; other – 1.1

Demography formulae

Total fertility rate (TFR) :
The sum of the ASFR for all reproductive age groups for a particular period

GFR= $\frac{\text{Number of births to women aged 15-44/49}}{\text{Mid-year population of women aged 15-49}} \times 1000$

Gross Reproduction Rate (GRR):
Sum of the ASFR (births of daughters), for all reproductive age groups for a particular period

Net reproduction rate (NRR):
Average number of daughters that would be borne, according to specified rates of mortality and ASFR, by a new-born female

Maternal mortality ratio: $\frac{\text{no. of mat deaths}}{LB} \times 1\text{lakh}$

Intrapartum or ≤ 42 days post partum
(Except d/t accidents/electrocution)

MCC – PPH

MM rate = $\frac{\text{no. of mat deaths}}{\text{\# repr age grp}} \times 1\text{lakh}/1000$

IMR: $\frac{\text{no. of infant deaths (0-1yr)}}{LB} \times 1000$

Perinatal mortality ratio: $\frac{>28\text{wks POG} / >1000\text{g SB/LB} + 0\text{-}7\text{d neonatal deaths}}{\text{total births}} \times 1000$

Complete family size: TFR Target TFR: 2.1
Best for impact of FP: TFR
Best measure of growth of population: NRR Target NRR: 1 CPR: >60%
Most important indicator of Health status of country: IMR
Quality of heath care delivery services: MMR
Combined Pediatrics + Obstetrics care: PNMR

Nutrition

RDA: 97% population daily dietary requirement

PRUDENT DIET– WHO Expert Committee
- Reduce total fat intake to 20–30% of total energy intake
- Limit saturated fat to <10% (ideal:<7%) of total energy intake
- Reduce dietary cholesterol to <100 mg per 1000 kcal/day
- Cholesterol: HDL ratio <3.5
- Increase complex carbohydrates
- Avoid alcohol consumption
- Reduce salt intake to ≤5 g/day

Modification	SBP Reduction
Weight reduction	5–20 mm Hg per 10 kg weight loss
Adopt DASH eating plan	8–14 mm Hg
Dietary sodium reduction ≤100 mEq/day (≈2.4 g sodium or 6g NaCl)	2–8 mm Hg
Physical activity	4–9 mm Hg
Moderation of alcohol consumption	2–4 mm Hg

Reference	Man	Woman
Age	19-39yrs	19-39yrs
Weight	65kg	55kg
Height	177cm	162cm
BMI	18.5-22.9	18.5-22.9
Sedentary	2100	1700
Moderate	2700	2100
Heavy	3400	2700

fssai – Indian – food safety

FAO – Codex Aliment – HQ: Rome

BIS – Bureau of Indian Stds.

FLUORINE
DENTAL- >1.5ppm SKELETAL- >3ppm – bone density ↑ + interosseous membrane ossified
Prevention: NALGONDA (NEERI) → Lime + Alum + Bleaching powder
IODINE requirement :
CHILD 90 ADULT 150 PREG 250 LACTATION 285 mg
Protein requirement 0.8g/kg
Best for protein quality:
DIAAS > PDCAAS > NPU (retained uptake)

LIMITING aa

Cereal	Threonine, Lysine (Mali)
Maize	Lysine (trolley), Tryptophan ← Niacin
Pulse	Cysteine, Methionine (PCM)

Food adulterants

Neurolathyrism

- Spastic paralysis of lower limbs in adults
- Toxin: BOAA (Beta oxalyl amino alanine)
- Adulterant: Khesari Dal (Lathyrus Sativus)
- Rx: Steeping /parboiling, Vit C, Ban crop

Epidemic dropsy

- Non-inflammatory, bilateral swelling of legs, with diarrhoea, cardiac failure
- Toxin: Sanguinarine
- Adulterant: Argemone Mexicana (oil) in Mustard oil
- Test: Nitric acid, Paper chromatography

Endemic ascites

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

Aflatoxicosis → HCC

- Aspergillus flavus
- Aflatoxin in groundnuts, cereal, maize
- Prevent: Keep moisture below 10%

Health programs- MCH

जननी सुरक्षा योजना

JSY
↑ institutional delivery
(CASH)

	Rural	Rural	Urban	Urban
	Mother	Asha	Mother	Asha
LPS	1400	600	1000	400
HPS	700	600	600	400

JSSK
≤ 1yr

SMA
free ANC

labour room

- Green – No risk factor
- Red – High-risk
- Blue – PIH
- Yellow – Diabetes, hypothyroidism, STDs

SaQushal: hospital quality
MUSQAN: pediatric care
Kayakalp awards: cleanliness / hygiene
Navjat Sishu Suraksha Karyakaram (NSSK): personnel
newborn care (+) safer - delivery

MVY

5000/- < 3000/- → ANC registration
2000/- → institutional del + vaccine: BCG/DPT/OPV/Hep B (≤ 14 wks)
6000/- 2nd child ♀

bf ↑
↳ asap
↳ in 1hr - NVD
↳ in 4hr - LSCS

ANC and PNC till 6months
104 helpline

Single digit NMR and still birth rate by 2030

Maternal and child health

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

RBSK
RASHTRIYA BAL SWASTHYA KARYAKRAM
राष्ट्रीय बाल स्वास्थ्य कार्यक्रम
FROM SURVIVAL TO HEALTHY SURVIVAL

(2° prev) – Early detec^n (0 – 18 yr)
4 Ds: Defects, Deficiency, Dev delays, Diseases
Mobile health units → 6–18 yr – twice yly

RKSK (KISHORE) 10–19 yr

AFHC – Adolescent friendly HC
WIFS – wkly IFA – 100 mg Fe + 500 ug folate
Menstrual hygiene-FREEDAYS
Saathiya approach – peer-support

KISHORI SHAKTI YOJNA (KSY)

RMNCAH + N: (repr, maternal, newborn, child, adolescent, nutrition)
HBNC by ASHA:
Home: 1, 3, 7, 14, 21, 28, 42 – (7)
Institutional: 3, 7, 14, 21, 28, 42 – (6)
LSCS: 7, 14, 21, 28, 42 – (5)
HBYC by ASHA: 3m, 6m, 9m, 12m, 15m (5)

SAPNA – leprosy

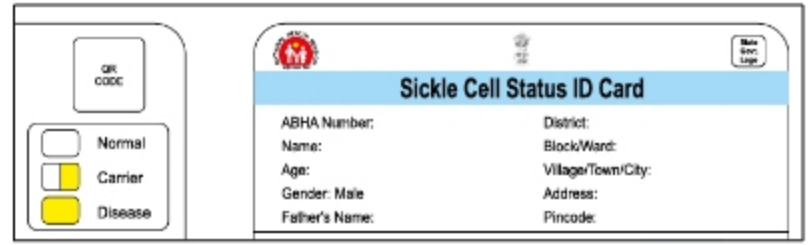
– UNICEF

UNICEF
- G – Growth monitoring
- O – Oral rehydration
- B – Breastfeeding
- I – Immunization
- F – Family planning
- F – Food supplements
- F – Female education

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण - देश रोशन

MOWCD
Malnutrition free by 2022
SULA: Stunting UW LBW (2% /yr) Anemia (3% /yr)

NATIONAL SICKLE CELL ANAEMIA ELIMINATION MISSION → by 2047



- screen prick - penicillin prophylaxis x 5yr
- CRISES Mx - Hydr
  - Hydroxyurea
  - Analgesic

PM POshan SHAkti Nirman

মধ্যাহ্ন আহার প্রকল্প
Mid Day Meal Scheme

Mo Education
Government primary and upper primary schools (Class I-VIII)

	Cal 1/3	Prtn 1/2
Primary	450	12
Upper primary	700	20

min : x 200d

MOWCD (AWC – AWW)
0-6yrs
10-49yr/Pregnant/ Lactating female
- Supplementary Nutrition
- Pre-School Education
- Immunization
- Health Check-ups
- Referral Services

1 AWC: 1/400-800
1 CDPO-100 AWW (1 block-1 lakh)

ICDS

	Cal 1/3	Prtn 1/2
6m-6y	500	12-15g
Severely malnourished children	800	20–25g
Pregn/lactating	600	15-18g

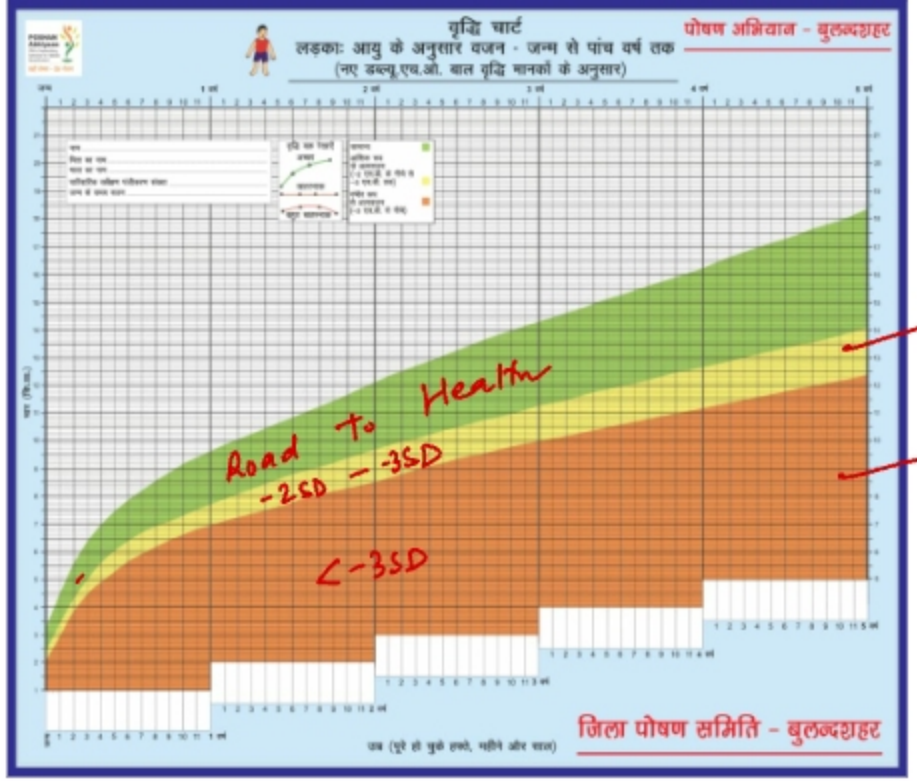
ANEMIA MUKT BHARAT

6×6×6 STRATEGY

beneficiary interventions institn mechanism

- IFA
- Deworming albendazol — 10 Feb, 10 Aug
- digital method
- awareness
- fortifn - R
- non nutritional

	Fe	Folate	Frequency
6-59m	20 mg	100 µg	Syp – biwkly
5-9y	45mg	400 µg	wkly (PINK)
10-19y	60mg	500 µg	wkly (BLUE)
20-49 Females			wkly (RED)
Pregnant (180d)			OD (RED)
Lactating (180d)			OD (RED)



Home-based Nutritional counsell

Refer to CHC (FRU)

Growth Charts: WHO Multicenter Growth Reference Study (MGRS)

शक्ति और बुद्धि का रक्षक
आयोडीन नमक

IDSP

Targets-Goitre rate : <5 %
Urinary I excretion rate: >100 µg
Salt at Production level : >30ppm
Consumer level : >15 ppm

Syndromic: Grassroot workers (MPW) - c/f
Presumptive: Doctors (MO) - c/f + exam
Lab confirmed: Lab + +

Health In Your Hands
आपकी सेहत आपके हाथ
NCD
National Program for Prevention and Control of Cancer, Diabetes, Cardio-Vascular Disease & Stroke

- Cancer
- DM
- CVD
- Stroke
- COPD
- CKD
- ARF (Vigyam)
- NAFLD

→ 5 lakh / family
⊗ type / age / number of family
✓ Govt
✓ Pvt – 10 beds =

UJALA- LIGHT

UJJWALA- SAFER FUEL
MINISTRY OF PETROLEUM

UJJAWALA

PREVENT HUMAN TRAFFICKING
RESCUE REHABILITATION
REINTEGRATION OF VICTIMS.

.ABHA-ID
eSanjeevani — tele-medicine
Ayushman Bharat day: 30 April

- SANKALK: booklet – NACO
- Nishchay: UPT kit – village
- Nikshay: TB-digital – POSHAN → 1000/- month
- Nikushth:] Leprocy
- SPARSH]
- KIRAN: } tele-MANAS → suicide prevention
- MANAS }
- INSPIRE: child abuse ↓
- Mission Parivarik Vikas (FP) – Nayi Pahel kit – ocp / condoms
- Mission Shakti (MoWCD): SAMBAL-security
- SAMATHYA-empowerment
- Vandemataram scheme — Pvt clinic ← Govt – IPA / DOTS / contracep
- PM Swasthya Suraksha Yojana – AIIMS new

Essential ONC NBCC (PHC) care corner	Basic EmONC NBSU (FRU-CHC) Stabilisn upgraded: 24 hr blood bank	Comprehensive EmONC (District) SNCU Special NB care unit unstable
Registration	Antibiotics, Ocytocic, Antiepileptic IV/IM	
Postnatal care (PNC) and newborn care	Manual removal of placenta	Surgery, including cesarean section
	Manual vacuum aspiration	
	Vacuum extraction	
	Newborn resuscitation	

NRHM- NUHM

	Hilly/tribal	Plains	Staff / Beds
Sub-centre-Centre (Ayushman Arogya Mandir) – diagnostic A- x del B- ✓ del Urban (HWC): 1/10k	1/3000	1/5000	MPW ♂ / ♀ = ANM. A: 1-2 b B: 2-3 b
PHC-State A-<20d/m B- >20d/mon School health Urban: 1/50k	1/20k	1/30k	MO-PHC / AYUSH-MO / Pharmacist / Lab techn / Nursing / MA = HV A: 4-6 b B: 6-10 b
CHC-State FRU	1/80k	1/1.2L	Med, OBG, Surg, Paeds, Ophthal, Anesthesia
U-CHC Metro:	1/2.5L 1/5L		→ 30-50 → 100
Village level staff:	AWW 1/400-800 | ASHA 1/1000 → 2/1000		VHG 1/1000 TBA = Dais 1/1000
Mahila Arogya Samiti: USHA:	1/250-500 1/1000-2500		(50-100 HH) (200-500 HH)

SCHOOL HEALTH: PHC
Area: > 10 sq ft per child
Less than 40 students per classroom
Desk: Mimic type
1 urinal/ 60 students,
1 sanitary latrine/100 students
1/150: 1 teacher -> <6/9 referred to PHC

VILLAGE HEALTH SANITIATION AND NUTRITION COMMITTEE: ASHA + Panchayat
Rogi kalyan Samiti: at PHC /CHC
(Pt welfare)

Population norms:
1 doctor/ 1000
1 nurse/ 5000
1 lab tech /10k
1 pharmacist /10k
1 malaria microscope/ 25k
1 SET / 25k
1 ophthalmologist/5 lakh population or 5 CHC

Health care delivery in India

ASHA	AWW	TBA	VHG	MPW (m)	MPW (F)= ANM
Education: 10th (8th)	10th	–	6th	12th	
Training: 23d (AWW/ ANM)	4mon	1m	3mon	1yr	
25-45yr Married/divorce/widow Village panchayat selects Should be of same village DAKSHATA training Mother and child care: Counselling, visits Depot: ORS, antibiotics, IFA, FP NO: x vacc^n / x delivery Impact indicator: IMR	Reports to Mukhya Sevika UDISHA training	ANM	Educates	• Malaria • Sputum • Chlorination DAKSHATA training	• ANC register • Delivery • Vaccine • IUCD insertion DAKSHATA training ANMOL

'Mobiliser'

tablet - based software

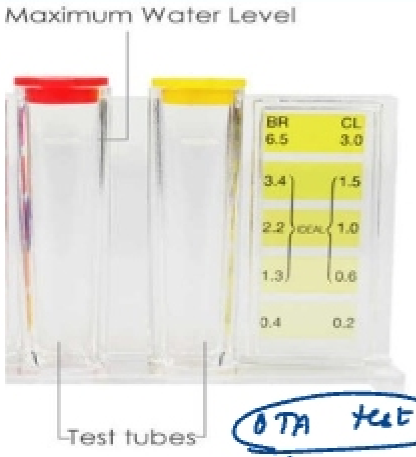
Environment

starch iodide

Horrock's apparatus
↳ Cl⁻ demand

n x 2g bleaching powder → 455L

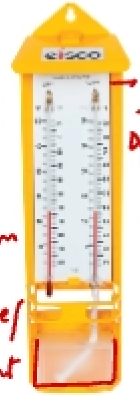
Chloroscope
↓
residual Cl⁻



OTA test
↓
free + combined Cl⁻

Kata thermometer
↓
· low air velocity
· cooling power of air

Globe thermom
↓
effective/radiant temp



→ Humidity
Dry-wet bulb

Sling psychrometer
↓
Humidity

Anemometer
↓
wind velocity

Assman Psychrometer

Bacteriological indicators for water

Best test to confirm fecal contamination- E.coli

Recent contamination- fecal strep

Remote contamination- C. perfringes

Eijkman test- E.coli

HARDNESS OF WATER:

Temporary- HCO_3 Ca/Mg

Permanent- SO_4 / PO_4 / NO_3 / Cl^-

Removal: Base exc = Permutit method

Hardness: 200-500 mg/L

Langlier's saturation index: pH / TDS / Hardness

Disinfecting action: HOCL

Contact period- 1hr

Residual level :

Drinking water- 0.5 ppm

Post-disaster- 0.7 ppm

Swimming pool- 1 ppm

Cyclops- 2 ppm

Contact admin
Join our group

Water-borne: feco-oral - typhoid / Hep A / E

Water-based: cyclops - dracunculosis / D. latum

Water-washed: Scabies / trachoma

Water-related: VECTOR - borne

WHO ACCEPTABILITY CRITERIA – DRINKING WATER

- Turbidity: ≤5 NTU Colour: ≤15 TCU
- TDS: <300mg/L pH: 6.5–8.5
- Nitrates: <45 mg/L (Remote contamination)
- Most undesirable metal in water: Pb

Max radiation: Alpha: 0.5 Beta: 1 Bq/L

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

1. PM 2.5
2. PM 10
3. CO
4. NO2
5. SO2
6. 03
7. NH3
8. Lead

Rapid Sand Filter	Slow Sand Filter "old"
Occupies very little space	Occupies large area
Size of sand: 0.4–0.7 mm	0.2–0.3 mm
Chemical coagulation and sedimentation	Plain sedimentation
Requires highly skilled operation	Less skilled operation
Loss of head: 6–8 feet	~4 feet
Bacteria Removal 98–99%	99.9–99.99%

Best air-pollution indicator (industrial): SO_2
Secondary pollutant: Ground level O_3
Best biological air pollution indicator: Lichen
Soiling index: Smoke Grit index: Dust
Green house effect max: water vapour > CO_2 (Kyoto)

Mechanical Ventilation:

- Exhaust ventilation → stale air remove
- Plenum ventilation → fresh air inside
- Balanced ventilation
- Air conditioning filter – temperature

Door + Windows: > 2/5th floor space
Per capita space in house: > 70 sq ft
Overcrowding: 2 persons, age > 9 years, of opposite gender, sharing same room (except husband & wife)

METHODS OF REFUSE DISPOSAL = Garbage

1. Dumping- WORST
2. Controlled tipping / Sanitary landfill (Trench)- BEST.
Trench: 2–3 m deep, 4–12 m wide
•Area per 10k population : 1 acre
•3. Incineration – ↓↓space
•High-temperature dry oxidation
•4. Composting
•Integrated refuse + night soil disposal
Bangalore method – anaerobic hot fermentation
•5. Manure pits
•Used in rural areas
6. Burial method- Camping (temporary)

Sewage = Liquid waste with excreta

BIOLOGICAL OXYGEN DEMAND (BOD)

•Oxygen required for aerobic destruction of organic matter; Normal: 100–300 mg/L

CHEMICAL OXYGEN DEMAND (COD)

•Oxygen equivalent needed for chemical oxidation of organic matter

•Best estimated by potassium dichromate

SUSPENDED SOLIDS

•Normal: 100–500 mg/L

Sewage Treatment Plant (STP)

Primary Treatment:

Screening, Grit chamber, Primary sedimentation

Secondary Treatment

- Trickling filter
- Aeration (most important step)-Activated sludge

Septic tank

Used where no sewage treatment plant exists

Inside tank → Anaerobic digestion

Outside tank → Aerobic oxidation

Biomedical waste management (CPCB)

non-chlorinated bags

- VACCINE vials
- Cytotoxic drug vial
- expired drug vials

Return to manufacturer

- Human waste
- Animal waste
- chemical / microbiological culture media
- SOILED linen / gauze
- chemical

Incineration / Plasma pyrolysis

Rubber → Gloves / Foley's / syringes / vacutainer

Recyclable

SHARPS — needle, blades

Broken glass vials

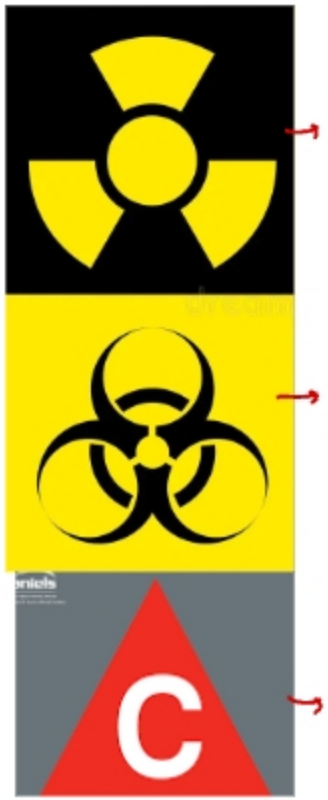
Implants

Recycle / Microwave / Autoclave / Shredding

Urine bag- Red
Blood bag- Yellow
Soiled gauze- "
Live vaccine vials- "
Cytotoxic drugs- "
Vacutainer- Red
Gloves- Red
Expired drug- Yellow
Syringe- Red
Syringe with needle- White
Pacemaker- Blue
Foley's- Red
Plastic wrapper of foley's- Black
Mercury spill - Cardboard → water
Blood spills- ↓- absorbent → 5% Hypochlorite mop.

COVID-19
Masks
Head cover
Shoe cover
Linen gown
Patient soiled tissues
} yellow

COVID-19
Nitrile gloves
VTM, Vacutainers
Goggles
Face-shields
Hazmat suits, Splash proof apron
Plastic coveralls
Red



→ Radioactive waste
→ Biomedical waste
→ cytotoxic waste

TB Sputum Disposal
1. Incineration-BEST
2. Boiling
3. Autoclaving
4. 5% Cresol

Acts-Mo Labour

FACTORY ACT 1948

NOT APPLICABLE: Defense, Mining, Railways, Eateries
Per capita space: > 500 ft3 Q
One Safety officer per 1000 workers. Q
Age <14yrs Not allowed
14-18 years : 6 AM-7PM-Max 4.5 hours per day.
MAX: 48hrs per week or less than 9hrs per day. (>18yrs)
OVERTIME: < 60 hours per week.

Notifiable diseases-29
Not included- Bagassosis

ESI ACT 1948

NOT APPLICABLE: D/M/R
Monthly salary <21k/mon
Employee: 0.75% Employer: 3.25%

Sickness benefit- 70% - 91d
Extended sickness benefit- 80% -2yrs (340)
Disablement benefit- 90% wages
Enhanced sickness benefit- 100% tubectomy 2wks /vasectomy 1wk

Maternity benefit- 100% -6mon
medical illness - 1mon MTP - 6wks.

Funeral benefit- 15k cash

RAJIV GANDHI SHRAMIK KALYAN YOJNA: contributed for >3yrs is entitled to claim unemployment allowance equal to 50% of wage for a maximum period of: 2yrs

Health communication

Didactic talk: Lecture
Talks series by experts with Q and A: Symposium Q/
4-8 experts in front of audience with Q and A: Panel D
6-12 ppl discussing: FGD
Practical skills teaching: Workshop
Step by step enactment (teaching community): Demonstration
Delphi method: Experts - anonymous questionnaire → F/U

Adoption model:
Awareness – Motivation –Action Q/
Cafeteria approach : contraceptn
GATHER : Greet Ask Tell Help Educate Review

Health Education	Propaganda
Knowledge and skills are actively acquired Behaviour centred	Knowledge is instilled passively in the minds of people Information-centred
Develops reflective behaviour; trains people to use judgment before acting	Develops reflexive behaviour; aims at impulsive action
Appeals to reason	Appeals to emotion
Develops individuality, personality, and self-expression	Develops a standard pattern of attitudes and behaviours according to world views

Technique of Interview
1.Establishing Contact
2.Starting an Interview
3.Securing Rapport
4.Recall
5.Probe Questions
6.Encouragement
7.Guiding the Interview
8.Recording
9.Closing the Interview
10.Report

Family

Phases of Family Life Cycle
- Formation - marriage
- Extension - 1st child
- Complete Extension - last child
- Contraction - 1st child
- Complete Contraction - last child
- Dissolution - one spouse
- Extinction - born

Temporary, subjective: opinion
Permanent, subjective: belief
Permanent, objective: attitude
MC emotion of man: FEAR

Study of disease and social conditions : Social pathology
Learned behaviour that is socially acquired: CULTURE
Mixing of two cultures: Acculturation
Right ways of doing things according to places/cultures: Folkways
Stringent customs: Mores

Electron family: Single parent family
Nuclear family: H + W + child (ren)
Joint family: ≥2 couples - males related by blood - shared kitchen
3-generation family: 3 generation
New family: ≤ 10 yrs

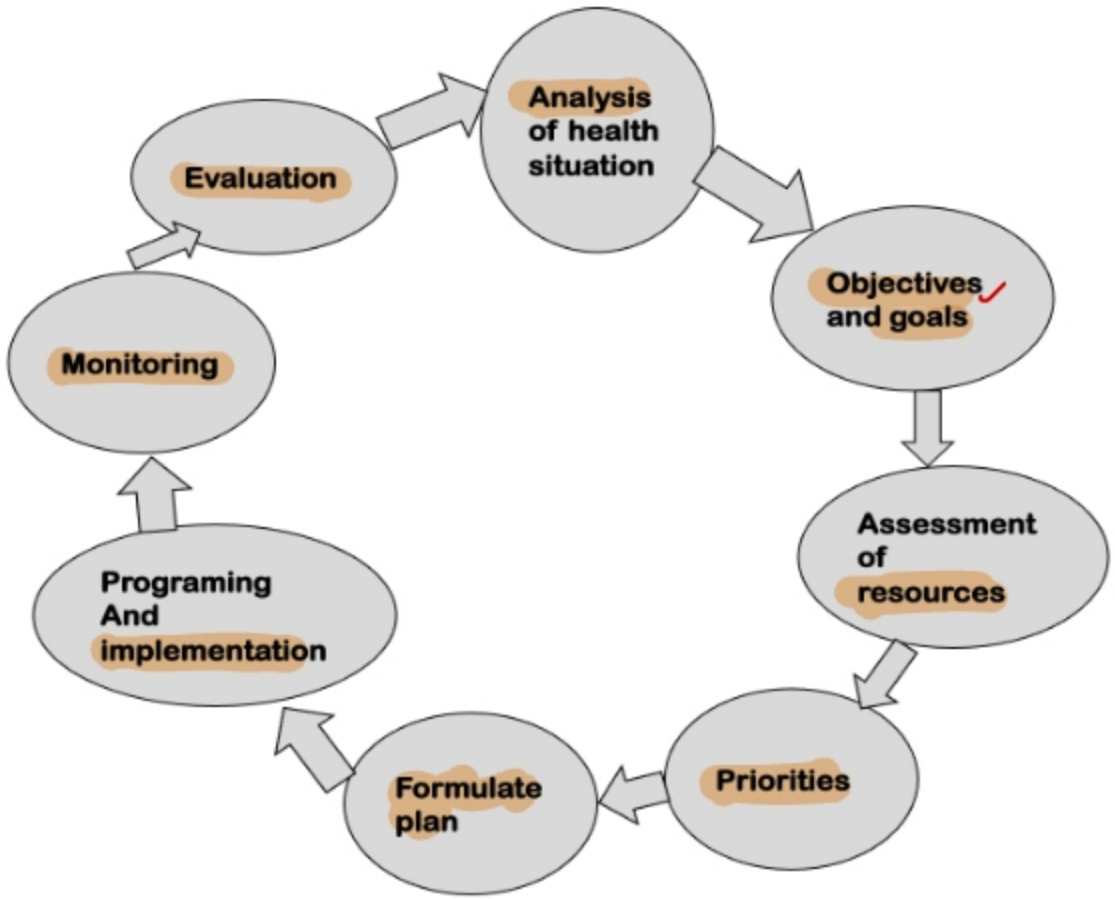
Kuppuswamy: Urban-Income, Occupation, Education of HOF
Uday Pareek-Rural

- Group of people come together temporarily, motivated by a common interest or curiosity CROWD
- Leader who forces the members into action (temporary, more emotional) MOB.
- Leader whose orders the crowd follows without question HERD.

Disaster management

Nodal ministry: Home Affairs Chairman: P
Decreasing impact of disaster: MITIGATION
Impact- Response- Rehabilitation-Reconstruction-Development-Prevention-Mitigation-Preparedness
MC disease: Gastroenteritis
MC vitamin deficiency: vit A
MC zoonotic disease: Leptospirosis
Vaccines to health workers: Hep B / TT ± Cholera / TCV
Only vaccine which can be given in outbreak: Measles
Most crucial preliminary step: Chlorination
Injury prevention during RTA using epidemiological tools: Haddon matrix

Health management and planning



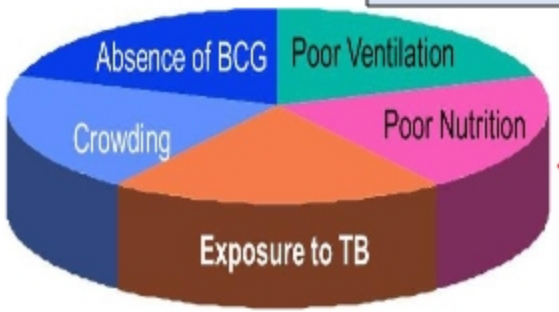
Goal: time-bound x → to become a good person
Objective: NEET PG ≤ / INICET =
Target: 1/100 M, 1/50 S, 1/55 S, 1/A 160

Cost-benefit analysis: monetary benefit
Cost-effectiveness analysis: QALY
Network analysis: Program management review technique (PMRT), CPM
Work sampling time →
Management by objective: behavioral sciences

Monitoring: routine measurements - process - internal audit
Evaluation: periodic → external audit - outcome
Surveillance: continuous analysis & feedback

- **Passive** - pt coming to hospital
- **Active** - MPW → TB/ Malaria / Kala azar / Polio
- **Sentinel** - 'hidden cases'

Essential health care 4-As:
Available
Accessible
Affordable
Acceptable



Sufficient causation

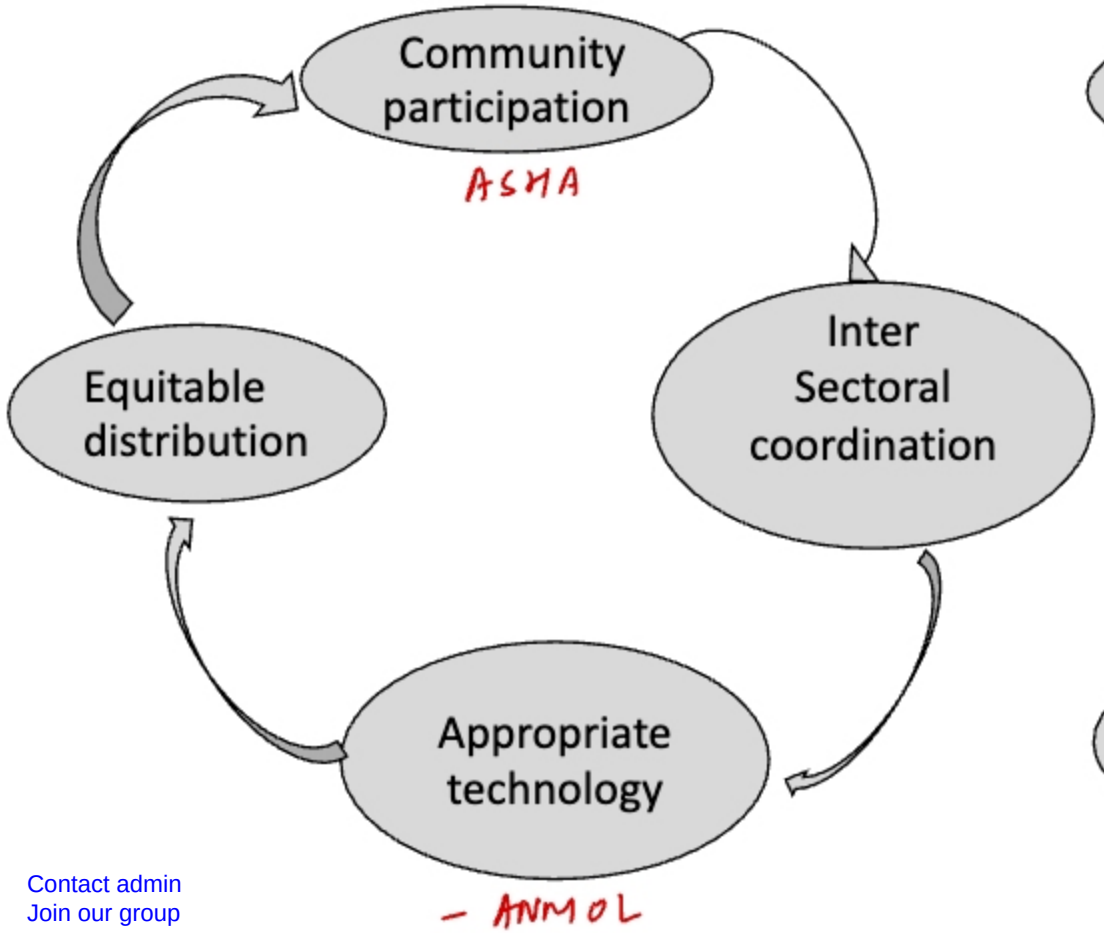
necessary causation M. tb

ABC Analysis STOCK / inventory
(Always Better Control)
VED Analysis
(Vital–Essential–Desirable)

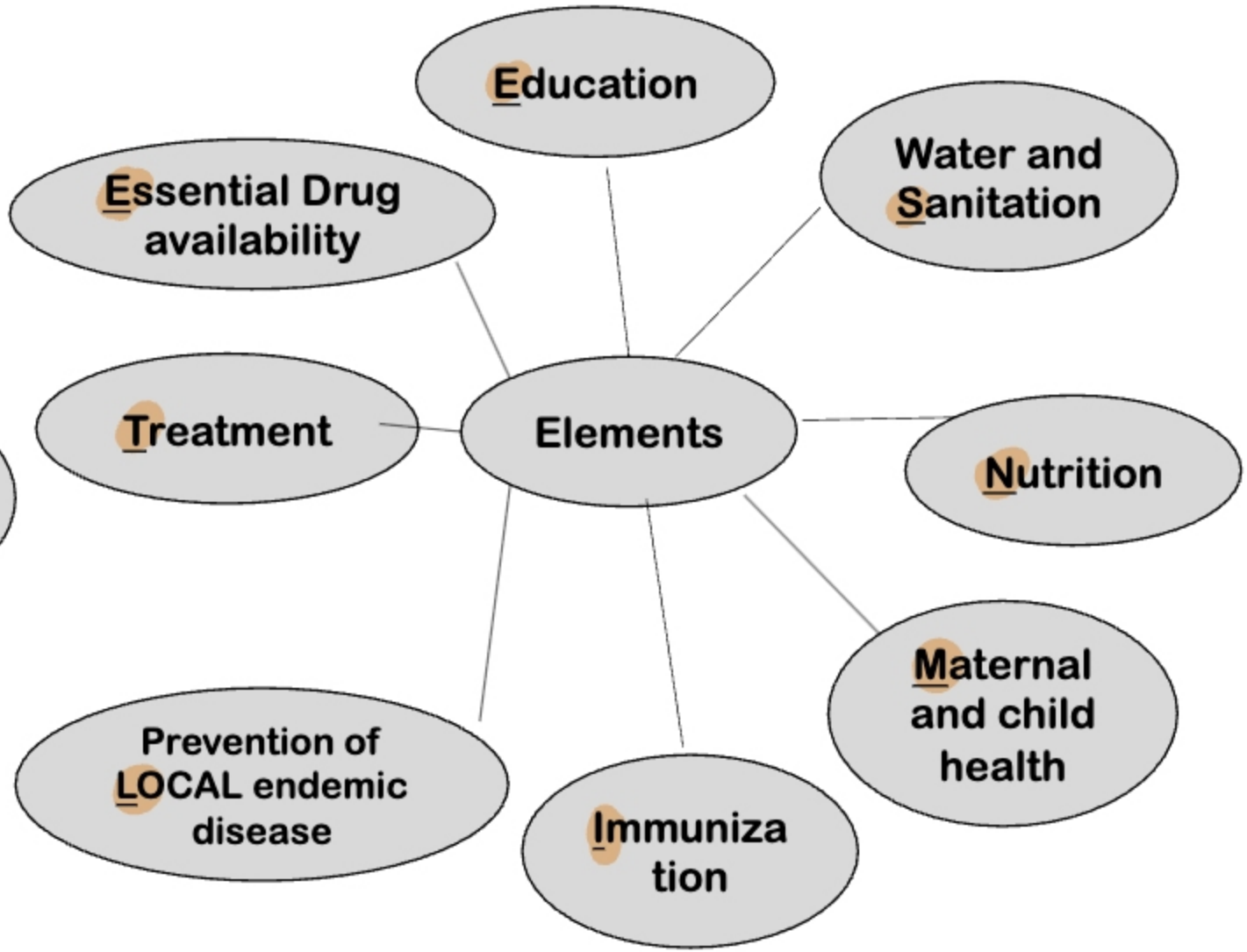
Committee	
Bhore	-PHC 1/40,000 -3 million plan -Social physicans
Mudaliar	All India Health Service
Chadah	-NMEP -1 basic health worker/10,000: malaria, vital stats, family planning
Mukherjee	Delink FP from malaria
Jungallwalah	-Equal pay for equal work -No private practice
Kartar Singh	- Female and male health workers (MPW) -> Health supervisor (for 4) - PHC 1/50,000
Srivastava	-Referral services -Re-orientation of medical eduction (ROME) -Rural health scheme: 3 tier
Krishnan	Urban revamping scheme
Bajaj	National medical and healthcare policy
Expert level	Universal health coverage
NITI AYOG	Replaced committees in 2015/ Developed health index; Chairperson: PM

Primary health care

Components of PHC



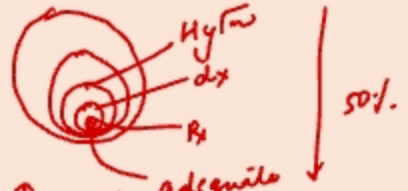
Elements of PHC



Miscellaneous

1. **Body Mass Index (BMI)= Quetelet index** (MC)
BMI = Weight (kg) / [Height (m)]²
2. **Ponderal Index**
PI = Height (cm) / (Cube root of Body Weight (kg)
3. **Brocca Index**
Ideal Weight = Height (cm) - 100
4. **Lorentz's Formula**
5. **Corpulence Index**
CI = Actual Weight / Desirable Weight
Should not exceed 1.2
6. **Skin fold thickness**: Mid triceps/ Biceps/ subscapular/ suprailiac
Sum <40mm males/50mm females

Rule of halves:



Tracking: Hytn

MONICA: Monitoring - NCD

WHO STEPS: Verbal / Physical / Biochemical

Luminous intensity: Candela
FLUX: Lumen
Illuminance: Lux

Dangerous particle size: 0.5 - 3 μ
Infectious diseases: Conditioning factor for malnutrition Q/
Proposed spending on healthcare sector by WHO: 5%
Right to life: Article 21
Concurrent list of Indian constitution: Food adulteration
Amrit: affordable medicines / implants
Indradhanush: ESI-C → VIBGYOR
Cancers: Male : Lip/oral > Lung **Female** : Breast > Cervical **Overall** : Breast > Lip/oral

WHO: 7 April, 1948 – Geneva (world health Day)
Ford foundation: building toilet rural India
NIHFW
SIDA: NTEP
DANIDA: Blindness program
Colombo plan: Cobalt RT unit
Applied nutrition program: UNICEF (manureless - farmer)
UNICEF: New York
NIN: Hyderabad
National Institute of Epidemiology: Chennai
Immediately notifiable (24hrs):
Polio/ Influenza/ Smallpox/ SARS

- MHGAP: No OCD
- DPDP 2023 Digital Personal Data Protection
- Emporiatrics: travellers'
- Bed-turnover ratio: slightly +ve

SDG (UNDP)- target by 2030:
MMR: ≤70 U5MR: ≤25 NMR: ≤12

Ottawa charter of public health

Exceptions to Hardy-Weinberg law (genetic - constant)
Small and dynamic populations
Non-random mating
Mutations
Gene outflow and genetic drift
Migration

BPL:
Rural: <2400 kcal /d
Urban: <2100 kcal /d

Bed-turnover ratio, Bed occupancy rate, Average length of stay, % infants immunised (- Health care utilis")
Doctor population ratio, Population bed ratio, Population per health centre (Health care delivery indices)