Sampling Methods & Inclusion/Exclusion criteria
INTRODUCTION
Methodology

- Study design
- Reference/target population
- Source population
- Sampling frame
- Inclusion & exclusion criteria
- Sample size determination
- Sampling techniques
- Randomization techniques
- Study time and duration
- Tools and materials
- Data collection
- Intended statistical test
- Operational definition
- Ethical consideration
- Framework of study
Methodology

• Random sampling vs. randomization

Population
- Random sampling
  - Sample

Population
- Sample
  - Randomization

Vs.
SAMPLING METHODS
Sampling

• Sample: a smaller (but hopefully representative) collection of units from a population used to determine truths about that population.
Sampling

• Reason of sampling;
  – Resources (time, money) and workload
  – Give results with known accuracy (can be calculated mathematically)
Sampling

• Sample can be obtained by identifying:
  1. Reference population/target population
  2. Source population
  3. Study population
  4. Sampling frame
  5. Sample
Sampling

• Process of sampling
  – Define population of concern
  – Specify sampling frame
  – Determine sample size
  – Specify sampling method
  – Implement sampling plan
  – Sampling and data collection
  – Review the sampling process
Sampling

• Population
  – Including all people or items with the characteristic one wishes to understand
  – Since time and money is usually limited, the goal is to find a representative sample (or subset) of the population.
Sampling

• Reference/target population:
  – To whom do you want to generalize your findings.
  – E.g. Malaysian adults population, Kelantan’s adult population, all patient’s with diabetes in Kelantan.
Sampling

• Source population;
  – The group from whom the study population is drawn

• Study population
  – The group studied
Sampling

- Samples are usually obtained from a sampling frame.
- Based on inclusion and exclusion criteria
- Sampling frame:
  - List from which the potential respondents are drawn.
  - Must be representative of the population
Sampling

• How to ensure sample representativeness;
  – Good sampling procedure
  – Adequate sample size
  – Take into participation (response) into consideration
Sampling

• When can we take entire population?
  – When population is very small
  – When you have extensive resources (time, money, manpower)
  – When expected response is low.
Sampling

Target population

Source population

Study population

Sampling Frame

Sample
Example

Target population: Adults in KB with DM

Source population: Adults with DM who received Rx at any health clinic in KB

Study population: Adults with DM who received Rx at KK Bandar KB

Sampling Frame: Those who fulfilled study criteria

Sample
Types of sampling method

• 2 types
  1. Probability random sampling
  2. Non-probability sampling
Types of sampling method

• 2 types

  1. Probability random sampling
     a. Simple random sampling
     b. Systematic sampling
     c. Stratified sampling
     d. Cluster sampling
     e. Multistage sampling
  2. Non-probability sampling
Types of sampling method

• 2 types
  1. Probability random sampling
  2. Non-probability sampling
     a. Convenience sampling
     b. Purposive sampling
     c. Quota sampling
     d. Snowball sampling
PROBABILITY SAMPLING
Probability sampling

• Every unit in the frame has equal probability of being selected as study participants.
Simple random sampling

• Applicable when
  – Population is small
  – Homogenous population
  – Sampling frame is readily available
• Each unit of the frame has an equal probability of selection.
• A number is assigned to each unit in the sampling frame
• A table of random number or lottery system is used to determine which units are to be selected.
Systematic sampling

- Relies on arranging the study population according to some ordering scheme and then selecting units at regular intervals through that ordered list.
- Involves a random start
- Proceeds with the selection of every k th element from the onward

\[ k = \frac{\text{population size}}{\text{sample size}} \]
Systematic sampling

• Advantages;
  – Easy to select sample
  – Suitable “sampling frame” can be identified easily
  – Sample evenly spread over entire reference population

• Disadvantages
  – Sample may be biased if hidden periodically in population coincides with that of selection
Stratified sampling

- Where population embraces a number of distinct categories, the sampling frame can be organized into separate “strata”.
- Each stratum is then sampled as an independent sub population
- Every unit in a stratum has same chance of being selected.
Stratified sampling

- Adequate representativeness of minority subgroups of interest can be assured by stratifying and varying sampling fraction between strata is required.
Stratified sampling

• Disadvantages;
  – Sampling frame of entire population has to be prepared separately for each stratum
  – Complicating design/analysis with multiple stratification
  – Potentially require a larger sample size
Cluster sampling

• Population divided into clusters of homogenous units (usually based on geographical contiguity)
• Sampling units are groups rather than individuals.
• A sample of such clusters is then selected.
• All units from the selected cluster are studied
Cluster sampling

• Advantages;
  – Cuts cost of preparing a sampling frame
  – Reduce travel and administrative cost

• Disadvantages
  – Sampling error is higher compared to simple random sampling of same size.
Multistage sampling

• Requires at least two stages
  – First stage: clusters are identified and selected
  – Second stage: units within the selected clusters are selected using any possible probability sampling method
NON-PROBABILITY SAMPLING
Non-probability sampling

- Elements are chosen arbitrarily
- No way to estimate the probability of any element being included in the sample
- Advantages;
  - Quick
  - Inexpensive
  - Convenience
Convenience

- Also known as
  - Grab sampling
  - Opportunity sampling
  - Haphazard sampling
  - Accidental sampling

- Sample those who are readily available and convenient
Purposive

• Also known as judgemental sampling
• Researcher chooses the sample based on who they think would be appropriate for the study.
Quota

- Population is segmented into mutually exclusive sub-groups.
- Judgement used to select subjects or unit from each groups based on a specified proportion (non-random).
Snowball sampling

- Similar to convenience sampling with the existing subjects are used to recruit more subjects into the sample.
INCLUSION / EXCLUSION CRITERIA
What is inclusion / exclusion criteria

- Also known as study criteria
- Used to ensure precision of a study
- To make sure study results are reproducible
- Who can be considered the potential study participants and who cannot need to be clearly determined
- Criteria are based on factors such as socio-demographic factors, disease severity, previous treatment, presence of comorbidities, etc.
What is inclusion / exclusion criteria

• Inclusion criteria
  – Criteria for someone to be included in the study
  – Can be screened easily
  – Example:
    • age between 12-60 years old,
    • Malay,
    • man.
What is inclusion / exclusion criteria

• Exclusion criteria
  – Criteria for someone to be excluded from the study
  – More difficult to be screened
  – Example:
    • Patients with abnormal LDL level
    • Patients with abnormal ECG changes
Importance of study criteria

• Inclusion / exclusion criteria need to be defined in an objective manner
• Aim is for consistency in participants selection
• Determine to whom the study results can be inferred to
THANK YOU.