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 Garki Hospital Abuja

 Resource Person

Research Methodology Boot Camp

with Epi Info Training

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MS Epidemiology & Biostatistics

PhD Public Health (Epidemiology)

Target Audience

Clinical Researchers, Post-Part 1 Residents, and Others

Important Information

- Limited slots are available on a first come, first served basis
- Laptop running Windows 10 required
- Organized as morning lecture sessions and afternoon hands on coaching sessions

For further details contact

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Highlights

- Research Methodology
- Research Design
- Data Management
- Sample Size Calculations
- Test Statistics
- Interpretation of Results
- Report Writing
- Hands-on training sessions
- Statistical consulting sessions

Variables and Scales of Measurement

Population

- A population is the **set of all measurements** of interest to a researcher.
- Typically, the population is **not observed**, but we wish to make statements or **inferences** concerning it.
- Populations can be thought of as existing or conceptual.

Existing populations

- Well-defined sets of data containing elements that could be identified explicitly.
- Examples include:
 - CD4 counts of every Nigerian diagnosed with AIDS as of January 1, 2016.
 - Amount of active drug in all 500mg Paracetamol manufactured in July 2016.
 - Presence or absence of prior myocardial infarction in all Nigerian males between 45 and 64 years of age.

Conceptual populations

- Non-existing, yet visualized, or imaginable, sets of measurements.
- Characteristics of all people with a disease, now or in the near future
 - Outcomes if some treatment were given to a large group of subjects.
 - Presence or absence of myocardial infarction in all current and future high blood pressure patients who receive short-acting calcium channel blockers.
 - Positive or negative result of all pregnant women who would ever use a particular brand of home pregnancy test.

Sample

- Observed sets of **measurements that are subsets** of a corresponding population.
- Samples are used to describe and **make inferences** concerning the populations from which they arise.
- Statistical methods are based on these samples having been taken at **random** from the population

Examples of samples

- CD4 counts of 100 HIV patients on August 1, 2016.
- Amount of active drug in 2000 500mg Paracetamol tablets manufactured during June 2016.
- Prior hypertension status (yes or no) among 150 males aged 45 to 64 years.
- Presence or absence of myocardial infarction in a fixed period of time for 310 hypertension patients receiving calcium channel blockers.
- Test results (positive or negative) among 50 pregnant women taking a home pregnancy test.

Variables

- The measurements to be made are referred to as **variables**.
- This refers to the fact that measured characteristics will vary among elements of the population.

“Variables vary”

Variables

- A variable is a measurement which can take any of a specified set of values.
- We measure, manipulate or control variables in research.
- Variables differ in 2 ways:
 - the role we assign to them in our research
 - the scale with which they are measured

Type of variables

Scale of measurement

- Qualitative (*categorical, discrete, discontinuous*)
- Quantitative (*numeric, continuous, scale*)

Role

- Independent
- Dependent
- Confounding

Qualitative vs. Quantitative

Qualitative

- Nominal (Non-ordered categories)
 - Grouped by name with no natural order
- Ordinal (Ordered categories)
 - At least 3 categories that follow a natural order

Quantitative

- Underlying continuum with equal units of measurement
- Significant digits of measurement limited only by precision
- Zero value means complete absence

Independent vs. Dependent

Independent

- A variable that determines the value of another variable
- Often manipulated to examine the effect changing it has on other variables

Dependent

- The variable that changes in response to the independent variable

Confounding variables

- Causally related to the dependent variable (outcome)
- Associated with the independent variable, but is not a direct consequence of the independent variable
- Bacterial vaginosis → Preterm labor
- Confounders: smoking, h/o preterm labor, parity, nutritional status, bacteriuria

Confounding variables

- Stratification in study design or analysis is used to control for important confounders
- Age, sex, race, socioeconomic status, marital status are common confounders
- An unidentified confounder may be responsible for an association (e.g. early studies linking HSV-2 with cervical cancer)

Confounding variables

- A variable may be independent in one hypothesis, confounder in another, and dependent in a third

Confounding variables

Effect Modifier (*interacting variable*)

- Confounding variable that modifies the effect of independent variable on dependent variable
- EBV alone → No Burkitt's lymphoma
- Malaria alone → No Burkitt's lymphoma
- EBV + malaria → Burkitt's lymphoma
- EBV interacts with malaria

Important note!

1. The type of variable used:

- Determines how you report your results
- Determines your choice of statistical tests
- Determines how variables are coded as fields for computer data entry

2. If you have a choice, use continuous variables

- Years of education, not just "primary, secondary, tertiary"
- Age, not just "20-29, 30-39, 40-49, 50-59, etc"