

Name: Haseeb

ID no: 13401

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Q 1: What is Hypothesis? Also explain different steps in testing of hypothesis.

Hypothesis:

A testible theory or statement of belief used in evaluation of a population parameter of interest.

OR

An hypothesis is a specific statement of prediction. It describes in concrete (rather than theoretical) terms what you expect will happen in your study. Not all studies have hypotheses. Sometimes a study is designed to be exploratory (see inductive research).

E.g. mean or proportion.

Steps in testing of hypothesis:

1. Specific of null hypothesis

The null hypothesis is a statement of no effect, relationship, or difference between two or more groups. This type of hypothesis is also called statistical hypothesis because this type of hypothesis is used for statistical testing and statically interpretation.

Example:

There is no difference in intubation rates across ages 0 to 5 years.

2. Specify the alternative hypothesis:

The alternative hypothesis (H1) is the statement that there is an effect or difference. This is usually the hypothesis the researcher is interested in proving. The alternative hypothesis can be one-sided or two-sided.

Example:

The time to resuscitation from cardiac arrest is lower for the intervention group than for the control (one-sided)

3. Set the significance level:

The significance level is denoted by Greek letter α is generally set is 0.05. This means that there is a 5% change that you will accept your alternative hypothesis when your null hypothesis is actually true.

The smaller the significance level, the greater the burden of proof needed to reject the null hypothesis, or in other words, to support the alternative hypothesis.

4. Calculate the test statistics and corresponding P-value:

Hypothesis testing generally uses a test statistics that compares two groups or examine association between variables.

The p-value describe the probability of obtaining a sample statistics as or more extreme by chance alone if your null hypothesis is true. This p-value is determined based on the result of your test statistic. Your conclusions about the hypothesis are based on your p-value and your significance level.

Example:

P-value = 0.01 This will happen 1 in 100 times by pure chance if your null hypothesis is true. Not likely to happen strictly by chance.

5. Drawing a conclusion:

Drawing a conclusion, rejecting null hypothesis if the p value is less than the set of significance level.

Example:

H0: There is no difference in survival between the intervention and control group.

H1: There is a difference in survival between the intervention and control group.

$\alpha = 0.05$; 20% increase in survival for the intervention group; p-value = 0.00

Q:02 What is meant by Prevalence in research? Also explain point and period prevalence.

Prevalence:

Prevalence is the presence of (proportion) of diseases or condition in a population (generally irrespective of the duration of a disease).

Prevalence is quantifies the burden of a disease.

Example:

The prevalence of obesity among American adults in 2001 was estimated by the U. S. Centers for Disease Control (CDC) at approximately 20.9%.

Point prevalence:

The number of all current cases (both old and new) of a specific disease at one point in time in a relation to a defined population.

A point in time can be either a day, few days, or even few weeks.

Example:

On June 30, 1999, neighborhood A has:

- Population of 1600
- 29 current cases of hepatitis A.

So, $29/1600 = 0.018$ or 1.8%

Period prevalence:

The total number of existing case (old and new) of a specific disease during a defined period of time in relation to a defined population.

It is the sum of point prevalence and incidence.

Example

Between June 30 and August 30, 1999, neighborhood A has

- Average population of 1600
- 29 existing cases of hepatitis B on June 30
- 6 incidence of new cases of hepatitis B between July one and August 30

So, $P_p = 29+6/1600 = 0.022$ or 2.2%

Q:03 Nine Students take a test. Their scores out of 100 are: 50, 79, 70, 48, 90, 68, 89, 92, 77, Find out the **MEAN**, **MEDIAN**, and **MODE** of their scores.

Mean:

First we find mean of the given data

To find mean, add if the number like;

$$50+79+70+48+90+68+89+92+77=663$$

Let's find the mean

$$663/9 = 73.66$$

Median:

Finding median now, total number of set is 9.

50, 79, 70, 48, 90, 68, 89, 92, 77

Now we arrange the set of given data like,

48, 50, 68, 70, 77, 79, 89, 90, 92

It's median is 77

Mode:

The repeating value is the mode of that data

So, there is no repeating values

So, no mode of this data.

Q:04 Differentiate between Relative risk and odd ratio with example.

Relative risk:

The relative risk (also called the risk ratio) of something happening is where you compare the odds for two groups against each other.

- Results are difficult to combine across strata.
- Can only be used for data from studies with a randomly selected sample e.g.

Cohort studies and cross sectional studies

- Can be used to calculate attributable risk.

For example, you could have two groups of women: one group has a mother, sister or daughter who has had breast cancer.

Odd ratio:

Odd ratio is a measure of association which compares the odds of disease of those exposed to the odds of disease those unexposed.

- Results can be combined across strata using mantel_haenzel methods
- Can be used to summarize data from most studies
- Given an estimate of risk when the prevalence of the outcome is not known.

if you are normally on call 2 out of 7 days in a week, then the odds of you being on call on a certain day of the week is $[(2/7)/(5/7)] = 0.40$.

Q:05 Write a short note on Presentation of research data.

Presentation of research data:

This refers to organization of data into tables, charts, graph, so that logical and statistical conclusion can be derived from the collect measurements.

Data may be present in 3 methods

- Textual
- Tabular
- Graphs

Textual presentation:

- The data gathered are present in paragraph form.
- Data can be written and read.
- It is the combination of text and figures.

Tabular presentation:

- Method of presenting data using the statistical table.
- A systematic and logical arrangement of data in the form of columns and rows with respect to the characteristics of the data.

Graphical presentation:

A chart is a graphical representation of data, in which "the data is represented by symbols, such as bars in a bar chart, lines in a line chart, or slices in a pie chart"

Kind of graphical presentation:

Bar graph:

Used to show relationship between groups.

Pie or circle chart:

Can be used to display nominal and ordinary data.

Histogram graph:

histogram is a graphical representation that organizes a group of data points into user-specified ranges. It is similar in appearance to a bar graph.

Line graph:

Most useful in displaying data that change continuously over time.