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# STATISTICS

1.randomized block design

**INTRODUCTION:**

A research design is a broader plan to conduct a study. A research design is the framework or guide used fro the planning, implementation, and analysis of a study. research design basically provides an outline of how the research will be carried out and the methods that will be used.

**DEFINITION RESERACH DESIGN:**

Research design can be defined as a blue print to conduct a research study, which involves the description of research approach, study setting, sampling size, sampling technique, tools and method of data collection and analysis to answer specific research questions or for testing research hypothesis.

-Suresh K Sharma.

**DEFINITION OF EXPERIMENTAL RESEARCH DESIGN:**

According to Riley, experimental research design is a powerful design for testing hypothesis causal relationship among variables. Ideally, in the experimental design , the investigator throws in a sharp relief of explanatory variables in which he or she is interested , controlling and manipulating the independent variable, observing its effect on the dependent variable , and minimizing the effect of extraneous variables, which might confound his or her results.

**RANDOMIZED BLOCK DESIGN:**

Control of inherent differences between experimental subjects and differences in experimental conditions is one of the difficult problems faced by researchers in biological sciences. When there are a large number of experimental comparison groups, the randomized block design is used to bring homogeneity among selected different groups. This is a simple methods to reduce the variability among the treatment groups by a more homogeneous combination of the subjects through randomized block design.

For example, a researcher wants to examine the effects of three different antihypertensive drugs on patients with hypertension. In this example, to ensure the homogeneity among the subjects under treatment, researcher randomly places the subjects in homogeneous groups like patients with primary hypertension, diabetic patients with hypertension ,and renal patients with hypertension.

This design looks similar to a factorial design in structure, but out of two factors one factor is not experimentally manipulated, like in the given example there are two factors, type of antihypertensive drugs and type of patients with hypertension, where only the type of drug is manipulated and type of patients with hypertension are simply grouped in different blocks with similar characteristics to ensure homogeneity.

| **TYPEOF ANTIHYPERTENSIVE DRUGS** | **PATIENTS WITH PRIMARY HYPERTENSION** | **DIABETIC PATIENTS WITH HYPERTENSION** | **RENAL PATIENTS WITH HYPERTENSION** |
|---|---|---|---|
| **A** | **A,I** | **A,II** | **A,III** |
| **B** | **B,I** | **B,II** | **B,III** |

| C | C,I | C,II | C,III |
|---|---|---|---|

2.non parametric tests

Almost nil or very limited assumptions, which are needed to be made about the data format, are needed for non parametric methods. There are a variety of methods generally used in different situations, however some of the commonly used methods discussed in this chapter are chi- square test, sig test, Wilcoxon signed rank test, and Mann- Whitney U – test.

**1.CHI-SQUARE TEST:**

This is non parametric test used to find out the association between two events in binominal or multi nominal samples . it is represented by a symbol X and is used to find out association between two discrete attributes.

For example, this test can be used if one wants to find the relation between smoking in pregnancy and low- birth- weight babies , blood pressure and renal diseases, and obesity and coronary disease.

**PRE REQUISITES OF CHI – SQUARE TEST:**

- Preferably random sample but not necessarily.
- Qualitative data measured on nominal or ordinal scale.
- Sample size should be more than 30.
- Lowest expected frequency not less than 5.

**2.SIGN TEST:**

The sign test is probably the simplest of all the non parametric methods .this test is utilized in comparing a single sample with some hypothesized value. Therefore, this test is of use in situations in which the one sample or paired t – test might conventionally be applied.

**STEPS IN PERFORMING SIGN TEST:**

- ✓ Step:1 mention the hypothesized value for comparison and the null hypothesis in particular.

- ✓ Step:2 attribute a sign to every observation as per whether it is less or greater than the hypothesized value.
- ✓ Step:3 find out
- ✓ Step:4 determine an appropriate p – value.

**3.WILCOXON SIGNED RANK TEST:**

The sign test is both to perform and intuitive. but it has one demerit that it attributes a sign to every observation as per whether it says above or below some hypothesized value and even does not consider the magnitude of the observation. Ignoring information on the magnitude of the observations is rather not efficient and might lesson the statistical power of the test. In this aspect, it can be said that wilcoxon signed rank test is an alternative that takes into account the magnitude of the observations.

**STEPS IN CONDUCTING WILCOXON SIGNED RANK TEST:**

- ✓ Step:1 mention the hypothesized value for comparison in particular and the null hypotheses.
- ✓ Step:2 ignoring their sign, rank all the observations in increasing order of magnitude. moreover, ignore observations, that are similar to the hypothesized value.
- ✓ Step: 3 attribute a sign to each observation as per whether it is greater or less than the hypothesized value .
- ✓ Step 4; determine
- ✓ Step : 5 determine an appropriate p- value.

**4.MANN – WHITNEY TEST:**

Both the sign test and wilcoxon signed rank test are helpful non parametric alternates to the one - sample and paired t –tests. A non parametric alternate to the unpaired t- test is provided by the wilcoxon rank sum test, which is also known as the mann – whitney U – test. This is generally considered when comparison is done between two dependent groups.

**STEPS IN CONDUCTING MANN – WHITNEY U – TEST:**

- ✓ Step :1 give rank to all observations in increasing order of their magnitudes by ignoring which group they come from. If two observations are of same magnitude, irrespective of group, they are provided an average ranking.
- ✓ Step:2 sum up the ranks in the smaller of the two groups. If the two groups are similar in size, then either of them ca be chosen.
- ✓ Step:3 determine an appropriate p – value.

3.vital health statistics and their use in health related research

**DEFINITION:**

Vital statistics are conventionally numerical records of marriage, birth , sickness and death by which the health and growth of community may be studied.

Vital statistics is data/record regarding marriage, birth, disease and death, on the basis of which community health and development are studied.

-Benjamin

**INDICATORS:**

- Demography and vital events.
- Environment health statistics
- Health resources facilities, beds, manpower
- Utilization and non utilization of health services attendance
- Health acre indices.
- Financial statistics.

**PURPOSE:**

- ✓ To describe the level of community health, diagnose community illness and solution of health problems.
- ✓ To determine success or failure of specific health problems.
- ✓ To promote health legislation at local and national level.
- ✓ To develop policies and procedure at state and center level.

## IMPORTANCE OF VITAL STATISTICS:

- To evaluate impact of various national health program.
- To plan for better future measures of disease control.
- To explain hereditary nature of disease.
- To evaluate economic and social development.
- It is primary tool of research activity.

### GENERAL USES:

- Legal necessity
- Administrative utility
- Useful in planning
- International utility
- Bases of social reform

### HEALTH USES:

- Determination of health status of individual/community, health problems and health needs.
- Making program me for health.
- Improvement in administration
- Comparing the health status of one nation with others.
- Evaluation of health program
- For research in matters related to health.
- For analysis of the trends of health statistics.

## SOURCES OF VITAL INFORMATION:

- Censes surveillance
- Registration of vital events
- Sample registration system record
- Hospital records
- Disease register
- Record linkage

- Civil registration system
- National sample survey
- Health survey

**POINTS OF VITAL STATISTICS:**

1) Maternal mortality rate
2) Maternal morbidity rate
3) Perinatal morbidity , mortality rate
4) Neonatal morbidity, mortality rate
5) Post neonatal morbidity , mortality rate
6) Infant morbidity, mortality rate
7) 1 – 4 year child mortality, morbidity rate
8) Under5 year mortality, morbidity rate.

**CRUDE BIRTH RATE:**

The number of live births per thousand estimated mid year population in a given year.

**CRUDE DEATH RATE:**

The numbers of deaths per 1000 estimation mid year population in one year, in a given place.

**INFANT MORTALITY RATE:**

The ratio of infant deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births.

**NEONATAL MORTALITY RATE:**

Number of neonatal deaths in a given year per 1000 live births in that year.

**MATERNAL MORTALITY RATE:**

The death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy.

**GENERAL FERTILITY RATE:**

This expresses number of live births per thousand women in the reproductive age group 15 – 49 years in a given years.

**LIFE EXPECTANCY:**

This expresses the average number of years of a person is expected to live, in the existing conditions of probability of death.

**MODE OF PRESENTATION:**

- Tabulation
- Charts
- Diagrams
- Maps