Writing Thesis Results

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The researcher understands the findings of his/her research after looking at the data collected to meet the objectives and after analyzing it statistically. However, the challenge is to make others understand the findings of one's research. The results section of the thesis essentially deals with making the observations known to the scientific community in a comprehensive and systematic manner.

During quantitative research, data is collected from a large number of subjects and on various parameters. This generates volumes of information. The numbers do not make sense unless converted into comprehensible form. This means, to make sense of that data, it has to be converted into summary values which are easy to understand and interpret. For this, the data are converted into tables and graphs. Tables help us to look at a set of data in a summarized manner. Graphs are a pictorial depiction of data. Besides table and graphs, a narrative has to be written, which describes the findings of the research in text. Therefore, the results section becomes a balanced mix of narration, tables and graphs.

The results section of the thesis may be organized in the following manner:

Description of the sample:

At the **beginning** a paragraph should be written describing the sample on which study has been conducted and from which population the sample is collected. It should include details about number of observations made and distribution of the observations with respect to their basic characteristics. For example, if the study is conducted on human beings, the sample should be described in terms of socio-demographic profile. It includes information regarding age and sex distribution. The social profile of the sample will include education, income, family size, and those parameters which are directly or indirectly relevant to the study topic. After the socio-demographic profile, the sample may also be described on any other parameter which is relevant to the study. Ideally only one or two tables should be included to describe the socio-demographic profile of the study subjects.

If it is a **descriptive** type of study, then subsequent tables should be used to describe the parameters on which observations have been made. For example, if a survey is conducted on knowledge of risk factors of non communicable diseases among college students, then the findings should be described as to how many respondents have the knowledge about various risk factors.

In an **analytical** study, attempts are made to establish association between the risk factors and the diseases. In such studies results section explains the association or its absence through relative risk and odds ratio. The odds ratios are described with their 95% confidence interval and corresponding levels of significance, described by p values.

The third type of study is the **intervention** study, where impact of one or more interventions is studied. The commonest form of an intervention study is a Randomized Control Trial (RCT). In such studies the impact is described in terms of effectiveness, efficacy and protective effect of different drugs, vaccines or non pharmacological interventions. This type of study has tables showing the protective impact of the intervention in different groups, namely the intervention and the control group. All analytical results must be reported with a 95% Confidence Interval as well as p values.

The **final section** of the results comprises of complex analysis involving multiple factors simultaneously. Such analysis is performed using various types of statistical techniques like Analysis of Variance (ANOVA) and Regression. Results reported here intend to describe the simultaneous effect of various contributing factors. Results are essentially reported as adjusted odds ratio and relative risk.

Graphs are used to depict the findings in a pictorial manner, which improves the depiction aesthetically and make it easy to understand. There are a variety of graphs like bar diagram, line diagram, pie charts, box plots etc. which may be used in the results section to describe the findings of the study. Though several types of graphs can be used for showing the same finding, there are certain rules of thumb that may be followed while choosing a graph. **Pie diagrams** are

commonly used to show percentage distribution or proportionate distribution. But if the categories are too many or small percentage distribution exists over several groups, the pie diagram will look busy and clumsy, therefore not advisable. **Line diagrams** are good for showing trends and **bar diagrams** are good for comparing pairs or sets of groups for example comparing distribution between male and female subjects, distribution of a variable across several levels of education etc.

The **narration** in results section of the thesis essentially describes the findings of the study. Whatever is shown in tables and graphs need not be rewritten all over again the narrative of results. Only salient features of each table and graph should be described in the narrative, preferably in active voice. Information which has not been shown in tabular format nor shown through graphs but is important in terms of its relevance, should be mentioned in the text. The text should be written in an order to describe the results. First the characteristics of the study sample should be described. Subsequently important descriptive findings should be narrated. Simple analytical results are described next. This consists of two by two tables or even larger matrix, usually accompanied with chi square and t-test results. Complex or multilevel analysis should be presented in the end. This includes findings of ANOVA, regression or factorial analysis etc.

One should remember that results are essentially a description of the findings. It is important to resist the temptation of discussing or interpreting your findings in the results section. Leave that for the discussion section.

Some Do's and Don'ts for results section:
Each table should have a title summarily describing the contents
Each table, graph/diagram and the narrative should have a justification
The same results should not be shown by tables as well as graphs
Cells should have numbers and percentage, both.
Cells may have measures of central tendency and dispersion (Mean±SD, Mean±SE, Confidence interval, Median, IQR, Mode, Min. and Max values etc)
Percent should be no more than 2 decimal points

All sample means should be stated with Standard Error (SE)

All population means should be stated with SD

SD and SE should not have more than 2 decimal points

Do not repeat in text what is shown in tables and graphs

Table should not be too small or too large. As a rule 6 to 24 cells in each table are acceptable.

Based on the data, decide whether to include row percent. column percent or total percent

Busy tables make reading difficult

Writing "S" and "NS" for 'significant' and 'not significant' is not a good practice. It is better to mention the value of 'p'