

## Scientific reporting and referencing

Even if you have all the materials and data ready, it may not be easy to start writing. Apart from the raw materials you may want to include in the reporting writing requires skills, motivation and time. You will need to strengthen your writing skills in academic language probably from reading scientific work or attending some course. The principles of scientific reporting are the same whether it is a scientific report, a scientific paper, a dissertation or a thesis, the principles are the same. In an academic language, you have to justify that your research was worth doing and you have used appropriate methods in your research. Then you have to describe your main findings and discuss them by explaining their strengths and weakness and comparing with similar studies.

The best way to start writing may be to write the outline of the report. This is done by writing down some keywords for each main section of the report (introduction, methods, results, discussion) like a preliminary table of contents. If you prepare this in advance well before starting report writing, you may be able to draft some parts of the report while you are conducting the study, particularly the methods section and the introduction. If you have prepared a study protocol before starting the study, you will have the advantage of having a lot of information on these two sections of your study.

### Title

Short and specific with every word carefully selected. Try not to exceed 15 words. Could be the research question as it is or expressed in another way

### Authors

Name of authors, qualifications and affiliation depending on guidelines.

### Summary (Abstract)

This section summarizes the report in a limited number of words. Most journals recommend a maximum of 200-250 words. The summary of reports, thesis and dissertations could be longer but usually not more than 2 pages. The abstract summarizes each section in a few lines. Write the summary after you have finished all other sections of the report.

### Introduction

This is the part of the report where you state your main research question, provide some relevant background information about it and explain why it is important to be researched. You have to convince the reviewer or the reader that the question you have studied is an important issue in health and that you were trying to find answers to the question which will be of important for improvement of health care and advancement of knowledge. Before starting the introduction, try to write down some

keywords that are important and you want to write about. The introduction section usually contains information on the following aspects of the study.

- An introduction about the subject area of the question.
- A literature review to identify the how much information is known about the study question and what are the gaps in current literature.
- Explain why, therefore, it is important to do this study, and what is its relevance to public health.
- A brief statement about the study question, study population and study design
- Study aims and objectives (this could at the end of the introduction or in a separate section).

The amount of space dedicated to each of these areas depends on the type of the report and guidelines, in a thesis or dissertation, one may have more freedom and space to write in more detail than in an article to a journal. Always read the recommendations and bind to the instruction for authors or reporting guidelines. One may be tempted to write in more details, but it has to be remembered that there is a maximum limit, therefore you should always try to stay focused on relevant information.

- Avoid detailed explanation of basic terminology and background information on the subject area. Remember who you are writing for; you are writing for academic people not lay people.
- Avoid too exhaustive review of the literature. There may be hundreds of articles on the subject area but you cannot include everyone. Try to include the most relevant ones like those closer to your study question in subject, design, geography etc.
- Stay focused on your study question, avoid explaining other questions.
- Avoid including information on results and conclusion.

## **Methods**

The methods section is the section where you tell reader what you did to answer the study question and how you obtained the results you have. This section should be detailed enough to enable readers to judge whether the methods you have used were appropriate; to identify any weaknesses in methodology that could have probably influenced the accuracy and interpretation of your results; and to enable them to repeat the study if they wanted.

The exact contents of the study depend on the study design. Broadly speaking the methods section will contain information on description of the study, selection of participants, sample size calculation, data collection instruments and procedures, data processing, data analysis, and ethical issues. The methods section in a journal article will be relatively short and you may have to write very concisely on the above issues. In a dissertation or thesis, you will have much more space and you are expected to provide more details on each section. Contents of the methods section in

a dissertation or thesis could be something like what follows.

- Study description
  - Study design
  - Study site
  - Study population
  - Proposed intervention (if interventional)
  - Main exposures and outcomes
- Selection of the study population
  - Inclusion criteria
  - Exclusion criteria
  - Sampling
  - Randomization (in RCT)
- Study procedures
  - Procedures at enrolment
  - Follow-up (if cohort)
  - Measurement of exposures and confounders
  - Measurement of outcomes
  - Laboratory and other methods (if applicable)
- Sample size calculation
- Data processing
- Statistical methods
- Ethical considerations
  - Confidentiality
  - Informed consent
  - Ethical approval

Information about the above sections of methods will be known to you before or while you are doing the fieldwork. Don't wait until you have completed your study to write start writing the methods section. You can save time by drafting methods section during the field work. You may forget information on the procedures and other aspects of methodology if you start writing at the need of your study. Be smart and save time and information by doing it early.

## **Results**

Everything in the results section will be about your own work. Here you will provide data to answer your study question in line with your objectives. In a journal article there is usually a limit for the number of tables and figures that you can include. So you have to include the most relevant ones. In a dissertation or theses you will have more freedom. In all cases try to be specific, stay focused on your study question and objectives, provide the most relevant data and don't repeat the same data in table and figures.

You have to display two types of data in the results section.

- Data to describe your study population to enable the reader to assess the

validity of your results. This could include data on background characteristics, non-participants; comparison of study groups e.g. participants and non-participants, controls and cases, controls and general population, etc.

- Data to support the answer to the study question.

The sequence of the results section should flow in a logical way. Start by describing the study participants, comparisons to show that the study is valid, descriptive analysis, main exposures, associations between the main exposures and the main outcome and then multivariate analysis. Remember this section only presents the results, don't try to comment or interpret the findings. Like other sections of the report, the results section could be divided to sub-sections depending on the study design and contents you want to display.

Try to use different methods to display the data like tables, graphs, histograms and pictures (if relevant). Don't display the same data twice e.g. in tables and graphs. Try not to have any table stretching over 2 pages. Be smart in formatting the tables. Be consistent in formatting the tables and presenting decimal places, percentages. In the text accompanying the tables, try to present only main contents of the table and then refer the reader to the table. Don't mention all contents in the text.

## **Discussion, recommendations and conclusion**

The discussion section is the place where you interpret your results and try to critically evaluate your work. You have to show strengths and weakness of your work and potential sources of bias and their effect on the results. You will also compare your results with results from other sources and explain discrepancies. After doing all these then you can provide the final answer to the research question. The discussion section could be divided to subsections such as key findings, strengths and limitations, comparison with other studies and conclusion and recommendations.

You may be required to provide a section on recommendations in reports, thesis and dissertations. Keep these recommendations focused. One can have some recommendations for action to control the disease or ameliorate the situation. Try to be specific on the type of interventions and people who are expected to take those actions.

## **References**

Cite all references which you have used in this report. Be consistent in citing references. Although most biomedical publications use Vancouver (numbered) system but some may use Harvard (author, date). However, publications use different versions of these two systems in terms of punctuation, number of authors written and formatting of the text. Read the instructions for authors of the journal, read guidelines for thesis/ dissertation writing if available or consult your supervisor before deciding which system to use. The best strategy is to use computer reference

management programs such as EndNote or Reference Manager for citation. These programs facilitate your work during citation, updating references, and changing the citation system.

The following example is in Vancouver style to show how you cite the references. This book is about case control studies[1], the article talks about inhalation injuries[2], the website belongs to WHO[3] and the first book on case control studies[1] is repeated to show that you don't give a new number but use the number when it was cited for the first time. If you cite two references write both numbers separated by a comma[1, 3]. In the end, you will list all references[1-3] in the same order as they appeared in the text. This citation is done using EndNote.

1. Schlesselman, K.J., *Case-Control studies: design, conduct, analysis*. First ed 1982, New York: Oxford university press.
2. Palmieri, T.L., et al., *Inhalation injury in children: a 10 year experience at Shriners Hospitals for Children*. J Burn Care Res, 2009. 30(1): p. 206-8.
3. WHO. *Disease and injury regional estimates for 2004*. 2004. accessed June 20 2009; Available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_regional/en/index.html](http://www.who.int/healthinfo/global_burden_disease/estimates_regional/en/index.html).

Citing the same example above in Harvard system will be as follows. This book is about case control studies (Schlesselman 1982), the article talks about inhalation injuries (Palmieri et al 2009), the website belongs to WHO (WHO 2004) and the first book on case control studies (Schlesselman 1982) is repeated to show that you don't give a new number but use the number when it was cited for the first time. If you cite two references write both numbers separated by a comma (Schlesselman 1982, WHO 2004). In the end, you will list all references (Schlesselman 1982, Palmieri et al 2009, WHO 2004) in an alphabetical order.

1. Palmieri, T.L., et al., 2009. *Inhalation injury in children: a 10 year experience at Shriners Hospitals for Children*. J Burn Care Res. 30(1): p. 206-8.
2. Schlesselman, K.J., 1982 *Case-Control studies: design, conduct, analysis*. First ed , New York: Oxford university press.
3. WHO, 2004. *Disease and injury regional estimates for 2004*. 2004. Accessed June 20 2009; Available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_regional/en/index.html](http://www.who.int/healthinfo/global_burden_disease/estimates_regional/en/index.html).

## Acknowledgment

Here you appreciate and thank people and agencies who have contributed to your work but not enough to be listed as a co-author. These people could be reviewers, data-collection personnel, statistical consultants and typists.

## Appendices

You may be required to include at the end of your report appendices such as questionnaires, consent forms, ethical approval letters, patient information sheets and other documents which related to your study which you think are essential for the readers to be aware of.

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