

Two Days Online International Training on Research  
Manuscript Drafting and Publishing-EUDOXIA

# Writing Research Paper

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# Outline :

- Purpose of research writing
- Structure of research paper
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Conclusion

# Writing Research paper

- Research Paper : Academic writing based on original research on a specific problem, analysis and interpretation.
  - After publication it is called as research article.
  - Writing Research Paper is Art and Science:  
It is science because, the report is based on sound and robust principles of research methodology. It is an art, since writing is based on clarity, brevity, significance, and organization.
- Writing Scientific Paper( Thesis) > Presentation and Style

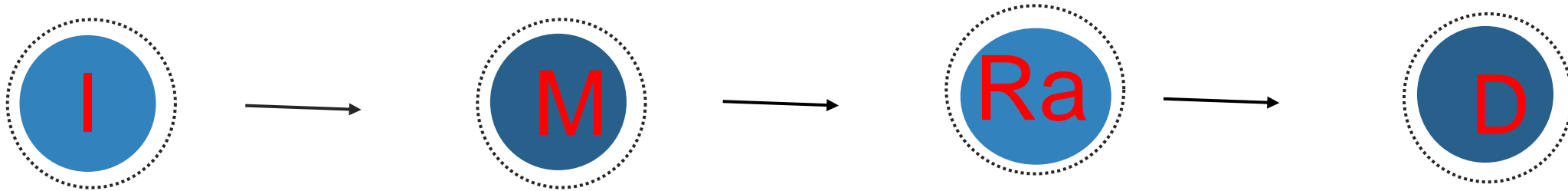
# Need of Writing Research Paper



# Stages of Writing & Publishing Research Paper

- Plan for research writing
- Prepare protocol, literature review, Ethical approval, Collect data
- Analyze data, prepare tables and graphs
- Decide target audience and journal
- Refer the instruction for authors & go through the recent issues
- Start writing the paper
- First Draft, Second Draft
- Submit the article electronically as per guidelines of journal

# Structure of Research paper



I

Introduction

M

Method

Ra

Result  
and

D

DISCUSSION

# Anatomy of Research Paper :

- Title Page
- Abstract (with Key words)
- Introduction (including literature review and conceptual framework)
- Material and Methods
- Results
- Conclusion
- Acknowledgements
- References
- Tables and Graphs
- Appendices

## Space Requirement

Section	Function	Paper Space	No of words
Abstract, Key words		1 page	200-250
Introduction	Why did you start?	1 -2 page	1000
Methodology	What did you do ?	2-3 pages	600
Results	What did you find ?	2-3 pages	400
Discussion Conclusion	What does it mean?	2-3 pages	1000
References		2-3 pages	20-30 References
Tables & Diagrams		2-3 pages	2- 4 Tables 1-2 Diagrams



# Abstract :

- Brief summary which tells the readers the purpose, significance, study population, research methods, and the main findings, conclusion and implications of your research study.
- Abstract gives the first impression about your paper
- The editors, reviewers and readers decide next course of action based on your abstract
- Use 200-250 words and 5-8 keywords
- Start writing the abstract, after completion of writing your paper
- Types of abstract : Structured and Unstructured

# Structured Abstract :

The abstract should be a concise and precise summary of the paper :

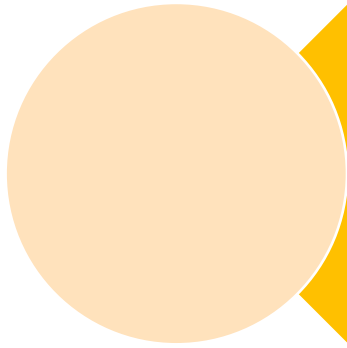
- Background
- Aim/objective(s)/Hypothesis
- Material and Methods
- Results
- Conclusions / Implications

## ABSTRACT

The antenatal care and child immunization are important strategies for reducing maternal and infant mortality rate. The present study aims to measure the economic and educational inequity in the use of antenatal care and child immunization for the state of Goa. The data for the present study was collected using a cross sectional study design based on two stage stratified random sampling method in North Goa District. The sample size consisted of 250 mothers delivered during last two years for measuring antenatal care, and 250 mothers of children in the age group 12-24 months. The data was analyzed using chi-square test, logistic regression, Lorenz's curve and Gini coefficient. The analysis of the data revealed that the use of antenatal care was 78.2% and the use of child immunization was 89.2 %. There was significant disparity in the use of antenatal care and use of child health care according to education of mother, religion and socio-economic status of mother. The Gini coefficient for the utilization antenatal care was 0.07 and 0.11 for educational and economic inequity respectively, whereas the Gini coefficient for child immunization was 0.04 and 0.03 for educational and economic inequity respectively. The inequity was more in use of antenatal care compared to child immunization, which highlights the needs for health administrators to reduce the gap in the antenatal care services provided to the pregnant women.

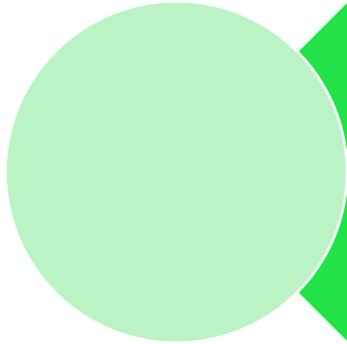
# INTRODUCTION

- Start this section with broad statements and narrow it down further, make more specific the research problem being studied
- Provide background information relevant to the selected problem & define the problem being studied.
- Rationale of the study : justifying undertaken research
- State the research question
- Significance of the study



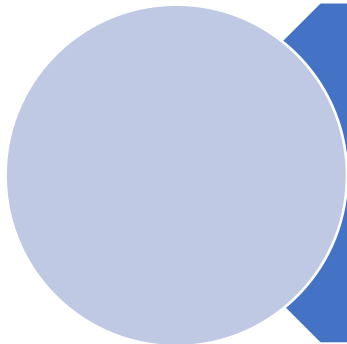
## STEP I

Background information -problem



## STEP II

Rationale of the study



## STEP III

Research question & Significance

# Significance

The significance of the research paper sets the study in context :

- Who are being benefited from the research?
- It makes clear how the findings of the your study will help to resolve the problem, filling gaps in the knowledge and influencing policy change.



## INTRODUCTION

India accounts 20 percent of global maternal deaths with a maternal mortality rate of 178 per lakh live births, and infant mortality rate still continues to be high with 50 infant deaths per thousand live births.<sup>1</sup>

The antenatal care is an effective intervention for reducing maternal mortality and child immunization is an effective strategy for reducing infant mortality rate.<sup>2</sup> The Millennium Development Goal aims at reducing the maternal mortality ratio by 75 percent and infant mortality rate by 50 percent during 1990-2015. In order to achieve these goals, all women need access to antenatal care and children needs to be fully immunized against vaccine preventable

diseases. Though the antenatal care and child immunization services are available and accessible through private and public health sector, there exists a lot of inequity in availing these services by the target population. However antenatal care services are available in developing countries but utilization of these existing services is poor. The National Family Health Survey-3 data shows only 19.4 percent of pregnant women in India utilized the Reproductive and Child Health (RCH) programme recommended antenatal care of three or more antenatal checkups with first check-up within the first trimester of pregnancy.<sup>3</sup> The NFHS -3 survey also showed inequality in the use of antenatal care and child



# OBJECTIVES

- The research problem has to be further narrowed and focused, objectives describe the expected contributions and outcomes arising from the study

- **SMART**

Specific

Measurable

Achievable

Relevant

Time based

pay.<sup>5</sup> The present study aims to measure the economic and educational inequity in the use of antenatal care and child immunization for the state of Goa. Goa, a western coastal state of India is a former Portuguese colony with a population of 14.57 lakhs as per 2011 census.<sup>6</sup>



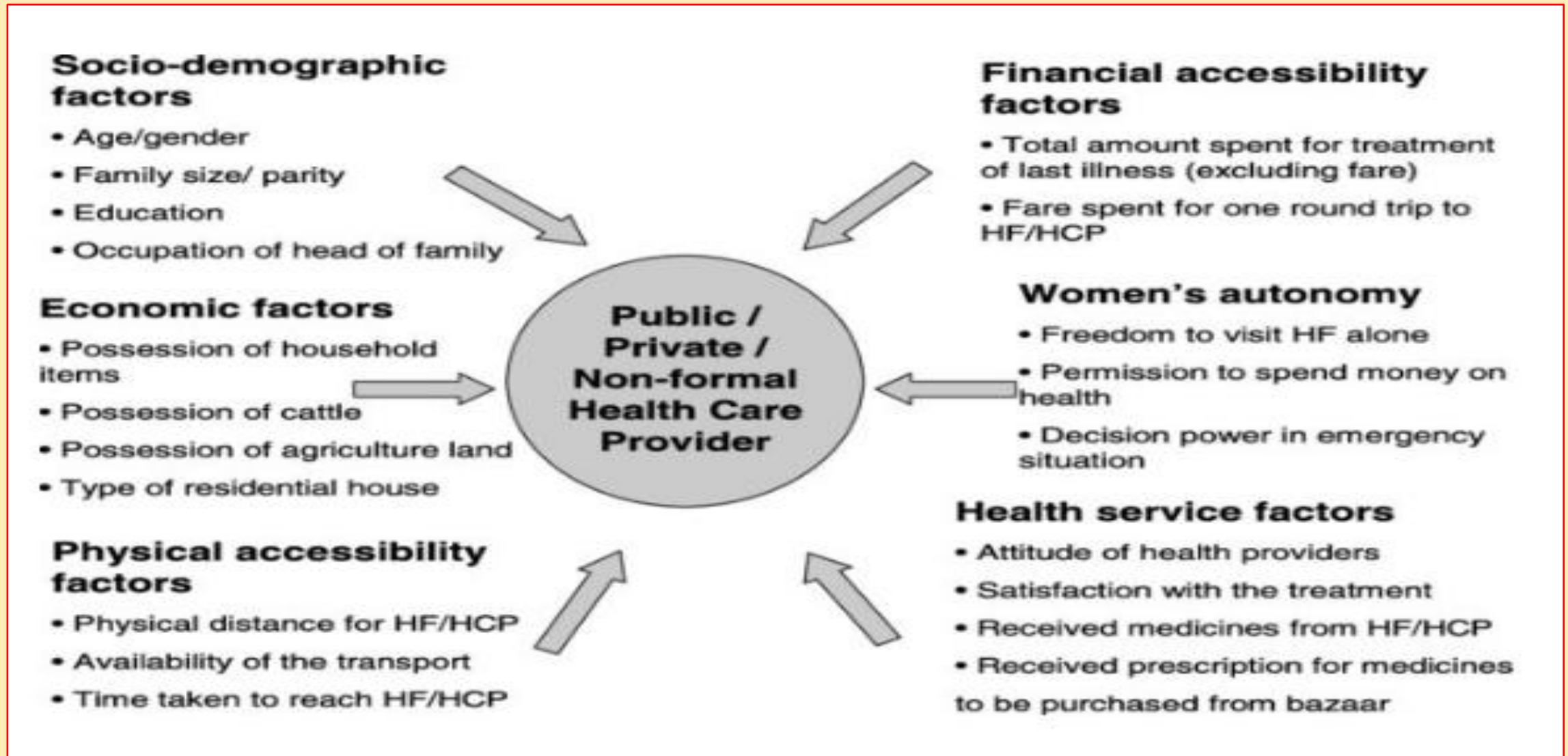
- Review of Literature
- Carry out exhaustive review of literature related to important issues of the research problem
- What is the nature of problem ?Where did the problem come from? What is already known about the problem? What methods have been used to solve it ?
- Refer to the aspects of literature, which are relevant to objective of the research study.

- Hypothesis is statement showing the anticipated relationship between two or more variables, mainly between independent and dependent variable.
- State Positive or Directional hypothesis

## Developing a conceptual framework

- With literature review, you will come to know that the problem you wish to investigate has its roots in many theories. The conceptual model is representation of a system.
- It is a diagrammatic representation showing relationship of variables.

Figure : Conceptual framework of Kroger's for studying determinates of health seeking behaviours



Source : Kroeger, A. (1983) Anthropological and socio-medical healthcare research in developing countries. Social Science and Medicine 17(3), 147–161.

# MATERIALS & METHODS

- The method section should clarify how and why study was done in a particular way & it is considered as brain the of the study. Provide all details so as to replicate the study by others. Method section should include :
  - Study Design
  - Study participants, sample size & sampling method
  - Data collection methods
  - Ethical issues
  - Statistical methods used for analysis

First identify type of study being conducted

- Experimental, Quasi Experimental or Non experimental (Observational)
- Descriptive or Analytical , Quantitative or Qualitative

State research Design :

- Experimental study : RCT, Pre-Post Test, Factorial Design
- Observational Study: Prospective , Retrospective  
Cross sectional (Survey)

In Experimental study we evaluate the interventional factors such as Drug, Exercise, Counselling , Health Education, Yoga etc

Explain in detail how the participants will be recruited and allotted to different Groups to receive the interventional material.

- Setting : School, Work place, Hospital, Community
- Define your target population
- Sample size ? Provide justification for sample size estimation
- Ex : Based on inputs (Mean $\pm$ SD or %) of similar prior study, a sample size of 145 for Treatment Group and 145 for Control Group were required in this study to be able to detect an Relative risk of stroke 2.0, with 80% power and 95% confidence at two tailed alternative.

- How the participants selected ?
- Sampling Method – Simple Random, Stratified, Systematic, Cluster
- Randomization – Random Number Table/ Computer generated
- Purposive sampling don't have generalization of Results.

## Methods of Data Collection :

### Preparation of questionnaire

- Testing of Reliability and validity of the questionnaire
- Questionnaire – Paper / Tablet
- Pilot Testing of questionnaire
- Data was collected on pre designed and pretested questionnaire
- Personal Interview / Postal /Telephonic / Website /Survey monkey / Google Form

### Identify Variables with data measurement scales

### Identify Dependent and Independent variable



# Data Management & Statistical Analysis

Object is to explain the how the collected data was analysed ?

- Which of the Statistical Methods were used ?
- Don't write appropriate statistical methods were used for data analysis.

After cleaning, the data was entered in to the MS Excel.

Later on the Data was analysed using the statistical software SPSS Version 25 / STATA / R etc.

The descriptive data was presented in the table in term of Mean $\pm$ SD for quantitative variables, Number and Percent for qualitative variables.

➤ For qualitative variables provide both numbers and %

# Statistical Analysis :

- Inferential statistics
- Qualitative outcome – Chi-square, Odds Ratio, Multiple Logistic Regression
- Quantitative out come : Parametric /Non Parametric Tests
  - Independent Student t test/ Mann-Whitney U test
  - Dependent Student t test / Wilcoxon's Signed Rank test
  - ANOVA / Kruskal Walli's Test
  - Repeated Measure ANOVA / Friedman's Test
  - Correlation & Regression
  - Multivariate Analysis : Factor Analysis, Discriminant Analysis etc.
- A p value less than 0.05 was considered statistically significant

Qualitative Research : Focus Group, Method & Number of session,  
Paricipants

# RESULTS :



# Results Section:

- The results of the study are based on the analysis of data collected by you during your research study. This section is considered as heart of the research study.

Purpose of data analysis :

- To answer your research question
- To achieve the stated aims and objectives
- To prove/refute the research hypothesis

It includes the descriptive statistics and inferential statistics.

# Presentation of Data

- Data analysis starts with presentation of data by summarizing data of all variables.
- Present your results in a logical sequence in the text, tables, and diagrams, giving the main or most important findings first.
- The results of the study are presented with help of text / table/ graphs and statistically significant difference between two groups (p value).
- The tables & graphs have ability to summarize entire data in an intelligent format.
- Avoid duplication of table & graphs.

# Strategy for Data Analysis

Descriptive study: Present descriptive statistics – description of your data showing Mean $\pm$ SD or No. & % in the form of table or graphs. Find the estimates such as Mean & percent with confidence interval.

- First provide the table / Graphs for background characteristics
- First perform Univariate / Bivariate Analysis
- Perform multivariate analysis

**Table 1 Background Characteristics of Mothers**

	Antenatal Care (n=250)	Child Immunization (n=250)
Age Group (Years)	No. (%)	No. (%)
15-24	75 (30.0)	40 (16.0)
25-34	169 (67.6)	190 (76.0)
35-45	6 (2.4)	208 (18.0)
Education Level		
Illiterate	19 (7.6)	18 (7.2)
Primary	27 (12.8)	31 (12.4)
Secondary	61 (24.4)	62 (24.8)
S.S.C and above	143 (57.2)	139 (55.6)
Socio-economic Status		
Upper class	45 (18.0)	41 (16.4)
Upper middle	62 (24.8)	63 (25.2)
Lower middle	47 (18.8)	48 (19.2)
Upper lower	67 (26.8)	68 (27.2)
Lower	29 (10.6)	30 (12.0)

## ***Tables***

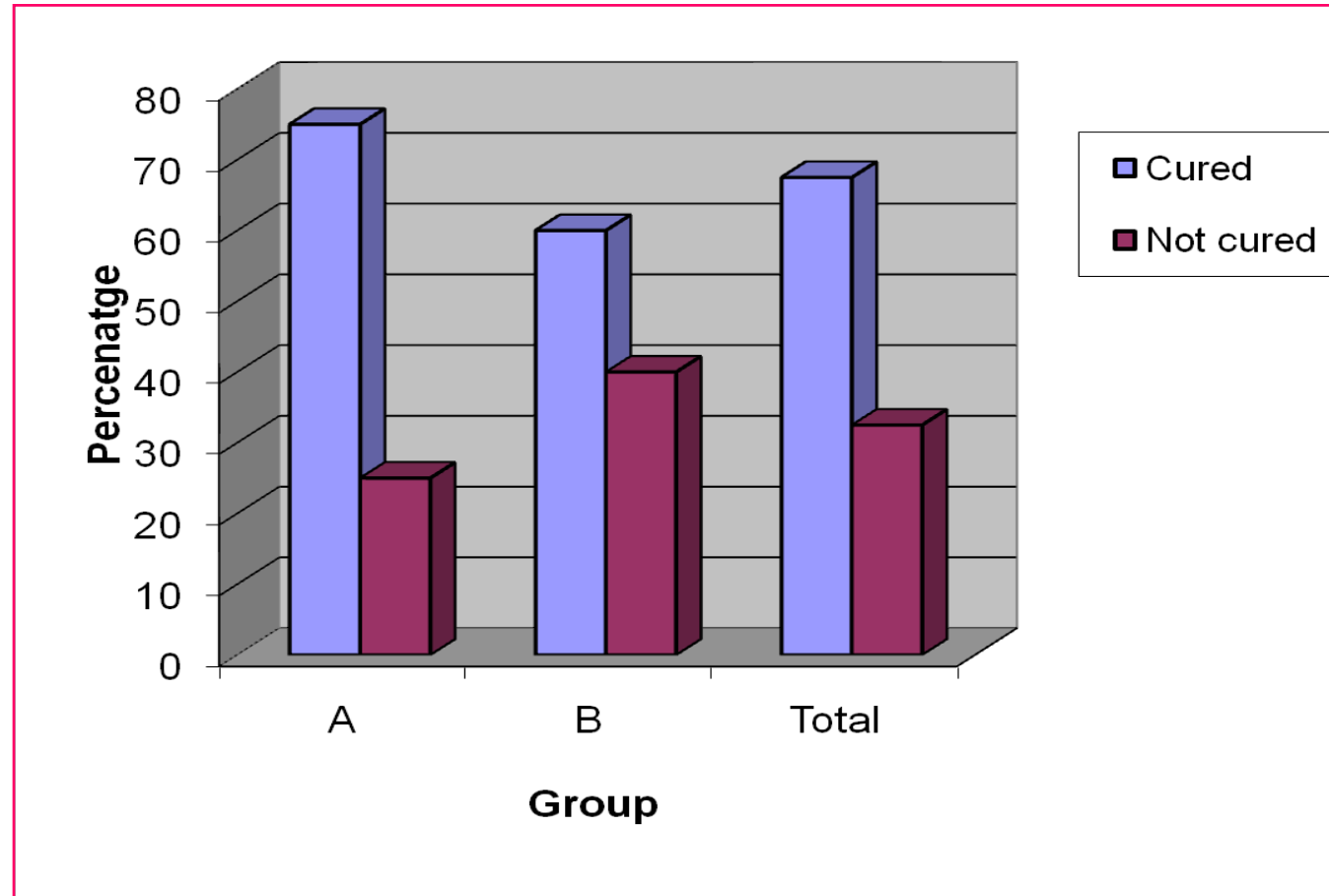
- Tables should be self-explanatory and should not duplicate textual material.
- Tables with more than 10 columns and 25 rows are not acceptable.
- Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.
- Place explanatory matter in footnotes, not in the heading.
- Explain in footnotes all non-standard abbreviations that are used in each table.
- Obtain permission for all fully borrowed, adapted, and modified tables and provide a credit line in the footnote.
- For footnotes use the following symbols, in this sequence: \*, †, ‡, §, ||, ¶, \*\*, ††, ‡‡
- Tables with their legends should be provided at the end of the text after the references. The tables along with their number should be cited at the relevant place in the text

## ***Illustrations (Figures)***

- Upload the images in JPEG format. The file size should be within 1024 kb in size while uploading.
- Figures should be numbered consecutively according to the order in which they have been first cited in the text.
- Labels, numbers, and symbols should be clear and of uniform size. The lettering for figures should be large enough to be legible after reduction to fit the width of a printed column.
- Symbols, arrows, or letters used in photomicrographs should contrast with the background and should be marked neatly with transfer type or by tissue overlay and not by pen.
- Titles and detailed explanations belong in the legends for illustrations not on the illustrations themselves.



Fig 1: Multiple bar diagram showing cure rate



# Strategy for Data Analysis

- For analytical studies provide in the table related information about the variables being compared (Mean $\pm$ SD in case of Normal distribution & Median and Inter Quartile Range in case of Skewed distribution) or No. & %, with 95% CI.
- Then provide inferential statistics i.e. information related to p value, which includes test statistics such as values of student t test,  $\chi^2$ , degree of freedom or measuring strength of association between two variables.
- Use upper italics (*P* 0.048). For all *P* values include the exact value and not less than 0.05 or 0.001.

**Table 2 Association between the Education level of mother and use of antenatal care and child immunization**

Education level of mother	Antenatal care n=250			Child Immunization n=250		
	Yes No (%)	No No (%)	Total No (%)	Yes No (%)	No No (%)	Total No (%)
Illiterate	6(31.6)	13(68.4)	19 (100)	10 (55.6)	8 (44.4)	18 (100)
Primary	18(66.7)	9(33.3)	27(100)	22 (71.0)	9 (29.0)	31 (100)
Secondary	42 (68.9)	19(31.1)	61 (100)	60 (96.8)	2 (3.2)	62 (100)
S.S.C.+	131(90.8)	12 (9.2)	143 (100)	131 (94.2)	8 (5.8)	139 (100)
$\chi^2 = 25.3, \text{ d.f} = 3, P < 0.01$			$\chi^2 = 39.21, \text{ d.f} = 2, P < 0.05$			

**\* Take proper Denominator while calculating percent**

**Provide Short description of the table**

**Table 5** The logistic Regression coefficients showing Odds ratio of use of antenatal care and child immunization

Independent Variables	Antenatal care	Child immunization
Women's Education		
Illiterate (Ref)	1.0	1.0
Primary	1.73 (0.9, 3.2) ns	1.36 (0.13-5.81) ns
Secondary	1.98 (0.8, 4.8) ns	16.24 (2.5-103.7) *
S.S.C. and above	4.41 (2.1, 7.6) *	5.81 (3.35-10.06)*
Exposure to radio		
Yes	2.52 (1.2, 5.2) *	1.0
No (Ref)	1.0	4.08 (1.12-14.93) *
Parity	0.51 (0.3, 0.7) *	0.59 (0.39-0.89) *
Const	2.43 *	-1.99*

## Table for more than two Mean & SD

Table 4 : Mean $\pm$ SD of salary and age of employees of company A and B

Parameter	Company A Mean $\pm$ SD	Company B Mean $\pm$ SD	P value
Monthly salary(000)	124 $\pm$ 12	154 $\pm$ 14	t=?, df=? P<0.05, Sign
Age years	28 $\pm$ 5	32 $\pm$ 6	t=?, df=? P<0.01, Sign

# Discussion :

- Include summary of *key findings* (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis);
- *Strengths and limitations* of the study (study question, study design, data collection, analysis and interpretation);
- *Interpretation and implications* in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?);
- what this study adds to the available evidence, effects on patient care and health policy, possible mechanisms);
- *Controversies* raised by this study; and *Future research directions* (for this particular research collaboration, underlying mechanisms, clinical research).

# Discussion Section:

- Answer the question posed in the introduction
- Then explain how the answer fits in (or does not fit in) with other published results
- Put the results into context.
- Do not repeat in detail data or other material given in the Introduction or the Results section..



# Do's & Don't of Discussion

## • Include in Discussion

- State main findings of the study
- Explain the meaning of importance
- Relate the findings to similar studies
- Consider alternative explanations
- State the relevance of the findings
- Acknowledge the limitations
- Make suggestion for further research

## • Don't Include in Discussion

- Drawing conclusion beyond study
- Unwarranted speculations
- Inflations of the important findings
- Conclusions that are not supported



# Limitation of Research study :

- No Research study is perfect or flawless

The limitations of a study are its flaws or shortcomings

- Due to unavailability of resources, small sample size, flawed methodology, etc.
- Measurement or data collection problem
- Data collected is not representative (purposive sampling) to generalize the results

Limitations of the study :

### **Limitations of the Current Study**

The current study presented exhibit limitations that should be considered. There are as follows:

- The sample size of the current study was 150. This sample size meets the minimum requirement.
- The non-probability sampling technique was used in this study.
- This research was conducted in the Management and Technical institutes in Gwalior city only.
- Time was a big constraint
- Sometimes non serious attitude of respondents.

### **Suggestions**

- It is suggested that bigger sample size should be used in further study.
- It is suggested that Probability sampling techniques should be used in the further study
- It is suggested that data for the study should be collected from different cities so the results of the study will become more generalized.

Source :Quality of Work Life and Job Satisfaction in Print Media Garima Mathur, Richa Banerjee, Chanda Gulati, Sanjay Kant Prasad, Priyadarshini Nagori, Anuj Bansal, Archana

# Conclusion Section:

- It should provide a brief summary of the results & should be more than a summary.
- Goal is to provide the most general claims that can be justified by the evidence.
- It should provide the key message of the author
- Don't repeat abstract, introduction
- Conclusion should answer all research question stated in introduction

# Reference Section :

- About 30 references can be included.
- Follow the style of the journal, APA, Vancouver , Howard etc.
- Use reference management software Mendeley, Endnote
- References has to be formatted correctly according to guidelines
- Include latest references
- These articles generally should not have more than six authors.

# Title :

- Title of the article should be short, continuous and sufficiently descriptive and informative , useful in indexing and information retrieval.
- Avoid to long title, Should not contain more than 15 words,
- Avoid abbreviations in Title
- Declarative title
- Connect Title with Experiment, outcome, subjects
- In concise way provide relevant information about your work
- Contain keywords, Descriptive phrase

# AUTHORSHIP

Authorship credit should be based only on substantial contributions to each of the three components mentioned below:

1. Concept and design of study or acquisition of data or analysis and interpretation of data;
2. Drafting the article or revising it critically for important intellectual content; and
3. Final approval of the version to be published.

(Indian Journal of Medical Research)

## Focus :

- Style of writing
- Grammar
- Plagiarism : Using some other person's ideas and information without acknowledging that specific person as the source.

## **Reviewers Focus :**

Completeness of Abstract

Originality of work

Importance of subject

Scientific reliability

Ethical Issues

Experimental/Research methods

Results, Figures & tables

Relevance of discussion

Conclusion & interpretation

References

Presentation & Writing style





# References:

Chris A Mack (2018). How to write Good A Scientific Paper. Spie Press, USA.

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Stephen B Hulley , S Cummings, et al. (2007). Designing Clinical Research, 4<sup>th</sup> edition, Lippincott William & Wilkins

Indayan A. (2016). Basic Methods of Medical Research. #rd Edition. AITBS Publishers, India.

**THANK YOU**