

Review Article

Basic statistical tools in research and data analysis

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Access this article online

Website: www.ijaaweb.org

DOI: 10.4103/0019-5049.190623

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ABSTRACT

Statistical methods involved in carrying out a study include planning, designing, collecting data, analysing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. This article will try to acquaint the reader with the basic research tools that are utilised while conducting various studies. The article covers a brief outline of the variables, an understanding of quantitative and qualitative variables and the measures of central tendency. An idea of the sample size estimation, power analysis and the statistical errors is given. Finally, there is a summary of parametric and non-parametric tests used for data analysis.

Key words: Basic statistical tools, degree of dispersion, measures of central tendency, parametric tests and non-parametric tests, variables, variance

INTRODUCTION

Statistics is a branch of science that deals with the collection, organisation, analysis of data and drawing of inferences from the samples to the whole population.^[1] This requires a proper design of the study, an appropriate selection of the study sample and choice of a suitable statistical test. An adequate knowledge of statistics is necessary for proper designing of an epidemiological study or a clinical trial. Improper statistical methods may result in erroneous conclusions which may lead to unethical practice.^[2]

VARIABLES

Variable is a characteristic that varies from one individual member of population to another individual.^[3] Variables such as height and weight are measured by some type of scale, convey quantitative information and are called as quantitative variables. Sex and eye colour give qualitative information and are called as qualitative variables^[4] [Figure 1].

Quantitative variables

Quantitative or numerical data are subdivided into discrete and continuous measurements. Discrete

numerical data are recorded as a whole number such as 0, 1, 2, 3,... (integer), whereas continuous data can assume any value. Observations that can be counted constitute the discrete data and observations that can be measured constitute the continuous data. Examples of discrete data are number of episodes of respiratory arrests or the number of re-intubations in an intensive care unit. Similarly, examples of continuous data are the serial serum glucose levels, partial pressure of oxygen in arterial blood and the oesophageal temperature.

A hierarchical scale of increasing precision can be used for observing and recording the data which is based on categorical, ordinal, interval and ratio scales [Figure 1].

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How to cite this article: Ali Z, Bhaskar SB. Basic statistical tools in research and data analysis. Indian J Anaesth 2016;60:662-9.

Basic Tools Of Research

J. Paulo Davim



Basic Tools Of Research:

Readings in Population Research Methodology: Basic tools United Nations Population Fund,1993 Fundamental Approach to Research Methodology: Key Concepts and Techniques Dr. Nagla Hussein Mohamed Khalid,Dr. Vipul A Shah,Prashanth Kampli,Dr. Mohammad Chand Jamali,2024-10-23

Fundamental Approach to Research Methodology Key Concepts and Techniques is a structured introduction to the art and science of research This book covers the fundamental principles practical techniques and ethical considerations necessary for conducting systematic and meaningful research Divided into eight comprehensive chapters it begins with a foundational overview of research exploring its objectives types and the critical role it plays across various disciplines From there readers are guided through the process of designing research formulating research questions selecting appropriate data collection methods and understanding sampling techniques Data analysis both qualitative and quantitative is covered with explanations of relevant software tools and visualization techniques that aid in interpreting and presenting findings Additionally the book addresses the essential components of a research report including structuring formatting and effective referencing to ensure clear and professional communication of findings The book also delves into advanced research practices such as case studies mixed methods approaches and action research catering to the needs of both novice and experienced researchers The final chapters focus on common challenges emerging trends and the ethical and social implications of modern research equipping readers to adapt to the evolving landscape of research Ideal for students educators and professionals this book is a valuable resource for anyone aiming to conduct research with integrity and depth

30 Essential Research Methods Explained in 7 Minutes Each Nietsnie Trebla, 30 Essential Research Methods Explained in 7 Minutes Each Unlock the world of research with clarity and speed In 30 Essential Research Methods Explained in 7 Minutes Each you ll discover a concise and engaging guide that demystifies the fundamental methodologies used in research today This book is designed for busy students professionals and anyone eager to grasp research concepts without the overwhelm of lengthy texts Each chapter presents a specific research method succinctly summarized and explained in just seven minutes With a focus on accessibility readers will gain vital insights into Quantitative vs Qualitative Research Understand the key differences and when to use each approach Surveys and Interviews Learn how to effectively design implement and analyze these crucial tools for gathering data Literature Review Techniques Master the art of reviewing existing research to support your own studies Case Studies and Experimental Designs Explore in depth strategies for researching specific instances and controlled experiments Data Analysis and Visualization Get acquainted with the basics of statistical analysis and discover how to present your findings effectively Research Ethics Delve into essential guidelines that uphold integrity and accountability in research Participatory and Action Research Engage with methods that emphasize collaboration and real world impact Each chapter equips you with the knowledge needed to navigate the complexities of research methods turning theory into practice with ease Whether you aim

to enhance your academic performance advance your career or simply satisfy your curiosity this book serves as your go to resource for quick and comprehensive research insights Join us on this enlightening journey through the essentials of research methods and become adept at conducting your own studies in no time

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expert witnesses and verify credentials And much more

The Language of Digital Education ,2024-12-16 This book presents concise definitions and illustrative contexts for many approaches ideas and paradigms related to digital education Unlike existing glossaries that often focus solely on technical terminology this resource uniquely integrates pedagogical technological and socio cultural perspectives It not only defines terms but also critically examines their implications for teaching and learning providing a more holistic understanding of digital education Contributors are Isabel Balteiro Miguel Angel Campos Pardillos Ka Long Roy Chan Salvatore Ciancitto Liubov Darzhinova Derya Duran Georgios Ellinas Stella Hadjistassou Pascal Hohaus Teppo Jakonen Marjut Johansson Merve K ymaz Ioannis Lefkos Ruslana Margova Claudia Mustroph Maarit Mutta Svitlana Nasakina Liisa Peura Alessandro Puglisi Violeta Stoji i Ralia Thoma Outi Veivo Johanathan Woodworth and Siyang Zhou

Ewles and Simnett's Promoting Health: A Practical Guide - E-Book Angela Scriven,Gareth Morgan,James Woodall,2023-08-09 The eighth edition of this seminal guide is designed to support public health practitioners in keeping up to date amid the rapidly changing complex challenges and contexts facing population health in the twenty first century Suitable for both undergraduates and postgraduates across a range of professions the Practical Guide provides theories principles and competencies for effective health promotion in multiple settings The book is organised into three parts covering an overview of the public health landscape the essentials of planning and management and how to develop capabilities across a range of activities The text has been fully updated to examine new issues facing public health including restructuring of the UK sector post European Union COVID 19 and its public health impact and legacy economic and cost of living influences on population health and the role of the internet and social media misinformation Includes promotion of healthier living working with communities and effective communication Outlines new research on the comparative effectiveness of different approaches to health promotion and public health practice Explores the increasing influence of the internet both in terms of its use for health promotion and its negative influence on wellbeing and health Describes changes to the structure and organisation of public health in the UK including the latest policies and national strategies Accessible writing style makes it easy to learn and remember Case studies bring theory to life Practice points help readers structure study Latest evidence on the response to the COVID 19 pandemic a permeating theme throughout the book All policy sections updated to reflect current policy frameworks and agendas New health data plus recent research on the comparative effectiveness of different approaches to health promotion and public health practice All case studies replaced with current scenarios more global examples of public health and health promotion action Fully updated references and practice examples

Managerial Decision-Making From the Perspectives of Behavioral Science and Neuroscience Wuke Zhang,Peter Ping Li,Jie Yu,Liuting Diao,Senqing Qi,2023-03-03

Teaching Lower Elementary Technology Mark Page-Botelho,2010-07-07 This book is a collection of my experience teaching lower elementary technology over the course of one year There are lessons curriculum documents and thoughts regarding many issues that

can arise while teaching technology to young children This book is intended to be a reference for those who are interested in starting from scratch or for those who are looking for new ideas on how or what to teach regarding information literacy

Program Report ,1977 Each issue covers a different subject **Intelligent Natural Language Processing: Trends and Applications** Khaled Shaalan,Aboul Ella Hassanien,Fahmy Tolba,2017-11-17 This book brings together scientists researchers practitioners and students from academia and industry to present recent and ongoing research activities concerning the latest advances techniques and applications of natural language processing systems and to promote the exchange of new ideas and lessons learned Taken together the chapters of this book provide a collection of high quality research works that address broad challenges in both theoretical and applied aspects of intelligent natural language processing The book presents the state of the art in research on natural language processing computational linguistics applied Arabic linguistics and related areas New trends in natural language processing systems are rapidly emerging and finding application in various domains including education travel and tourism and healthcare among others Many issues encountered during the development of these applications can be resolved by incorporating language technology solutions The topics covered by the book include Character and Speech Recognition Morphological Syntactic and Semantic Processing Information Extraction Information Retrieval and Question Answering Text Classification and Text Mining Text Summarization Sentiment Analysis Machine Translation Building and Evaluating Linguistic Resources and Intelligent Language Tutoring Systems **ICICKM 2019 16th International Conference on Intellectual Capital Knowledge Management & Organisational Learning** John Dumay,James Guthrie,Rahat Munir,2019-12-05 Human Factors in Simple and Complex Systems, Second Edition Robert W. Proctor,Trisha Van Zandt,2008-04-22 In terms of simple and complex systems it is a whole new world out there At the initial publication of this book fourteen years ago the web was in its infancy DVDs did not exist cell phones were few and far between and the information superhighway was just a blip upon the horizon If you used the terms social engineering you were most likely a political scientist and if you were phishing you might be listening to a rock band The second edition of a bestseller Human Factors in Simple and Complex Systems provides the necessary understanding of the breadth and depth of human factors issues that influence the design implementation and evaluation of products and systems Emphasizing the close relationship between basic theory and application the authors delineate a framework for the research process present an integrated view of the current state of knowledge and examine how these factors can be applied to system design The new edition addresses such concepts as situation awareness and highlights topics of interest with a special focus on computer applications and human computer interaction See what's new in the Second Edition New topics such as situational awareness that capture the tremendous changes in human factors and ergonomics Tightly integrates basic research and application strengthening the link between knowledge and practice Each chapter includes a separate box that discusses a topic of current interest related to human interaction with computers and

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Research Advances in Industrial Engineering J. Paulo Davim,2015-05-04 This book provides discussions and the exchange of information on principles strategies models techniques methodologies and applications of industrial engineering It communicates the latest developments and research activity on industrial engineering and is useful for all those interested in the technological challenges in the field

Electrical, Computer, and Systems Engineering National Science Foundation (U.S.). Division of Electrical, Computer, and Systems Engineering,1980

National Science Policy Study, Parts I-VII United States. Congress. House. Committee on Science,1998

e-Research Collaboration Murugan Anandarajan,2010-07-01 Research 2 0 is now a critical component in research management This book describes how Web 2 0 technologies can help researchers collaborate It contains examples of web portals including MyNetResearch and discusses critical aspects of research management

Research in Psychology Kerri A. Goodwin,C. James Goodwin,2016-12-08 An approachable coherent and important text Research in Psychology Methods and Design 8th Edition continues to provide its readers with a clear concise look at psychological science experimental methods and correlational research in this newly updated version Rounded out with helpful learning aids step by step instructions and detailed examples of real research studies makes the material easy to read and student friendly

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web followed when building the content of sets and the practice the steps outlined below are appropriate for the sets and how those sets fit into the total time frame of a training session will be suggested four usrpt sets for four sessions and two sets per session for the remainder if the swimmers are judged to be adapting well increase

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web examples of usrpt training segments are repetitions to failure of 50 m of freestyle swimming at 200 m race pace with 20 in usrpt sets before extreme neural fatigue begins to crossover into the next fatigue stage the criteria to terminate participation in the set would have been reached therefore the criteria for failure are usrpt s

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web usrpt workout 3 sets broken im dryland 1x 1 x 1 stretching 10min warm up 1x 1 x 200 freestyle 2:00 rest after set 1x 15 x 50 im 25 back 25 breast race 200 pace target time 1:4 of your fastest 200 im pace 2:00 0:30 25 back 25 breast race 200 pace target time 1:4 of your fastest 200 im pace

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web usrpt set per session 9 years four sessions per week emphasizing fun and technique two usrpt sets for two sessions and one for each of the other two sessions 10 years five sessions per week emphasizing skills technique and fun two usrpt sets for two sessions and one for each of the other three sessions

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web two example sets are 112 x 25 fs at 200 pace on 30 seconds and within the usrpt set failed and recovery repetitions do not contribute to the total yardage at race pace but successful repetitions after a failed and recovery repetition do silverman 1996 summarized very useful guidelines for developing skilled behaviors within

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web jan 23 2020 type in the sets and intervals and then log it for free warm up 1 x 200 freestyle 8 x 25 kick optional try to keep your full body underwater as you kick breathing every few seconds main set 3x times 4 x 25 freestyle 1 x 50 freestyle

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web apr 27 2017 it begins with a warm up and includes preparation to race prior to the main usrpt set the session focuses on the 50 frontcrawl event it begins with a warm up and includes preparation to race prior to the main usrpt set example 50m fc race time 28 5 seconds 15m pace time 28 5 10 2 85 per 5m 15m pace time 2 85 x 3 8 55

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web dec 21 2022 citation 46 this is similar to ar within a usrpt set for example a set is terminated when an individual cannot sustain the prescribed swimming interval velocity on 2 3 occasions see figure 1 rushall citation 44 suggests that day to day life stressors influence a swimmer s ability during training thus the inclusion of ar within

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