

Importance of statistical research in medicine



**ASSIGN
BUSTER**

The Nepal Journal of Epidemiology is the first journal of its kind in Nepal. Our main objective in pioneering this journal is to attempt to provide a common platform for all researchers, particularly those doing epidemiological studies on prevailing public health problems in the community. We wish to make this journal one that follows standard criteria of scientific article writing with sound technical knowhow. We have introduced several initiatives to improve the quality, reporting, and transparency of research in general, and randomised trials in particular, by emphasising the importance of protocols. We offer to review protocols to improve trial quality and reduce publication bias. We consider submissions of randomised trials only if registered and accompanied by a protocol, which is sent with the manuscript to peer reviewers. All who use, receive, or pay for health-care interventions depend on guidance from reliable research findings and will want reassurance that medical research is credible. Essentially, Nepal's research output is still small. More collaboration and partnerships between countries in different regions of Asia and externally must be fostered. Lack of investment in research should also be addressed by nations that are capable of investing more. Research in Nepal can and should flourish over the next decade.

A brief review through almost any recently published medical journal will show that statistical methods play an increasingly important role in modern medical research. Many research papers quote at least one ' p-value' to communicate their results while some present the results and the statistical analysis of medical data in relatively sophisticated and complex sets¹⁻⁸.

After extensive study of the available literature and from the personal experience in this domain, I would like to venture a few recommendations for

<https://assignbuster.com/importance-of-statistical-research-in-medicine/>

the improvement of various aspects in medical research and its application. I believe that this brief discussion will be of great value to all professionals involved in medical research and its application.

“ Medicine is a science of uncertainty and an art of probability”, mused William Osler. Medical journals are a confluence of medicine, science and journalism-and are expected to have the values of all three. The science that underpins medicine is presented in journals, and most journals can point to landmark studies that changed medicine. Medical journals differ from scientific journals in that they are mainly read, not by scientists, but by practicing doctors. Medical journals will continue to be the main vehicle of scientific information for years to come, particularly where access to computer and internet facilities are relatively limited. Currently, the output-and rewards-of research are based almost entirely on published papers in scientific journals. Scientists in low-income and middle-income settings want an opportunity to analyze data for their populations according to their own priorities. They want to be in the frontlines of national and global conversations about their country’s experiences. Evidence-based medicine provides several ways to quantify and communicate uncertainty, but does so from a probabilistic rather than a human perspective. We can divide Evidence based medicine/clinical epidemiology into two major methodological themes: ‘ statistical’ and ‘ implementation’. The use and analysis of large trials, meta-analyses, systematic reviews, evidence hierarchies, cost-effectiveness analyses, and number needed to treat would come under the ‘ statistical’ while the improved access to evidence through literature searching, library and critical appraisal tools, guideline

development, risk framing, etc. would be 'implementation'. Researchers welcome clinical uncertainty as a source of knowledge gaps, whose answers will be meaningful to clinicians and patients. Clinical epidemiology bridges clinical practice and public health.

Policies notwithstanding, despite suggestions to detect and eliminate research misconduct, training in research ethics, standards and responsible conduct is often minimal or absent in academia. The quality of medical journals depends on several factors involving three groups of people: namely the authors, the reviewers and the editors. Deciding who should be listed as an author is not simple, and too often the decision is made on the basis of power. The powerful are included, even when they have done nothing, and the weak are excluded, even though they have done most of the work. This unethical behaviour can become a major problem if the study proves to be fraudulent, as has happened many times. Sometimes journals receive coverage in the media that makes them squirm, particularly when they are exposed as having published research that is fraudulent. I worry that journals are being polluted by misconduct and that editors are not responding adequately.

Scientific reading will enhance the quality of scientific writing. Critical reading and thinking will provide a relevant, interesting, feasible, ethical and novel research hypothesis.

The author or researcher planning on a research study and publication should search in Medline, PubMed and other search engines for relevant reviews and literature of similar studies in world and national scenario. These

studies must be examined for strengths and weaknesses, and the researcher must apply required modifications for new knowledge. It will help the author tremendously in the writing of the introduction, discussion and conclusion part of the manuscript.

Before starting data collection, the researcher should decide upon the study design, target population, sample size and sampling method, inclusion exclusion criteria, study period, study variable, outcome measures and units of measurement, definition of all the terms and variables and their classification. After careful consideration, the methodology of data collection and the method of data analysis, including the computer packages and statistical methods, should be chosen. The instruments or questionnaire used to measure the variables should be described correctly and if others have developed them, referenced properly. A researcher should be well aware of the concepts of different types of data and variables, two types of errors (type I and type II errors), calculation of sample size, significance level, confidence interval, testing of hypothesis and power of the test¹⁻¹¹. Once these criteria are followed, the authors should allot paragraphs for each one of them in the material and methods part of the manuscript, thereby increasing the quality of the study. This meticulous planning and execution will be useful to new researchers in this area.

The editorial management is a crucial part of the publishing process. The editors begin action with the receipt of the manuscript by directing the various steps of evaluation, correction and re-submission, until an editorial decision is taken to accept the paper as is, accept it after modification or reject it if it is unacceptable. They then make necessary text and layout

<https://assignbuster.com/importance-of-statistical-research-in-medicine/>

editing. Due consideration is given to the statistical, multilingual and ethical aspects as well as to the overall uniformity of the terminology, nomenclature and style throughout the volume as a whole.

Experts review plays a pivotal role on maintaining the quality of a medical journal. A reviewer is required to address a number of important aspects of the paper and to make recommendation concerning the acceptability of the paper.

Findings of good research deserve to be presented well, and a good presentation is as much a part of the research as the painstaking collection and analysis of the data. Critical appraisal of 150 articles published in a reputed medical journal in Nepal reveals that in more than 70% articles experienced biostatisticians were not involved or substantially contributed (not co authored), more than 65% studies sample size calculation were wrong and 80% of the article with inadequate statistical details and wrong statistical tests.

Critical reviewers of the biomedical literature have consistently found that more than half of the published articles (including scientific articles, published even in the best journals) that used statistical methods contained unacceptable errors 1-11.

The term “ statistics” here in this context, has a wider meaning and includes the methodology of research, study design, or epidemiological methodology etc 1-8. The major applications of biostatistics started in the middle of the 17th century in the analysis of vital statistics. After the early developments in vital statistics, the field of genetics was the next area that benefited most

<https://assignbuster.com/importance-of-statistical-research-in-medicine/>

from the new statistical ideas emerging in the works of Charles Darwin (1809-1882), Francis Galton (1822-1910), Karl Pearson (1857-1936), and Ronald A. Fisher (1890-1962). Now, the fields of application and areas of concern of biostatistics include evidence based medicine, bioassays, public health, health service research, nutrition, environmental health, demography, epidemiology, surveys of human populations, community diagnosis, bio-mathematical modelling, clinical trials, brain imaging, genomics and proteomics. Computer-based statistical packages have not yet been given expertise to decide the correct method although they sometimes generate a warning message when the data are not adequate. The user of the package decides the method⁹.

The real solution to poor statistical reporting will come when authors learn more about the statistical methods in research design and when statisticians are able to convey the importance of the methods used in the study to authors, editors, and readers; when researchers begin to involve statisticians from the beginning of research, not at its end; when manuscript editors begin to understand and to apply statistical reporting and editing guidelines; when the journals are able to screen the articles containing statistical analyses more carefully; and when readers learn more about how to interpret statistics and begin to expect and demand, adequate statistical reporting⁷. A researcher should never hesitate to ask for professional assistance from a biostatistician to plan the study or experiment.

There may be valuable research going on in developing and financially less-privileged countries, but it usually does not reach international visibility, in spite of a large number of scientific journals in these countries. Such journals

<https://assignbuster.com/importance-of-statistical-research-in-medicine/>

are not only invisible but by perpetuating a vicious circle of inadequacy, may be directly damaging to the local science and research culture. Journals should prevent this by constructing an editorial board including qualified editors from developed and developing countries in the editorial board.

I recommend biostatisticians to join as editors and reviewers in order to help formulate journal policy, audit the quality of statistics in published papers, help produce statistical guidelines or checklists for authors, educate editors, provide explanatory statistical comments on published papers, and write expository articles about statistical matters in journals.