1.J Trauma Acute Care Surg. 2025 Jul 1;99(1):29-35. doi: 10.1097/TA.0000000000004664.

Regression analysis in clinical research

Regression modeling is a vital tool that develops correlations and associations between exposure and outcome. The outcome's characteristics and how it is captured in the data ultimately guides the decision to which model is selected. However, the interpretation and the statistics that go into model selection and study design dictate the validity of the model. Direct acyclic graphs and other study design techniques can be essential tools in determining the variables to include in the model and identify any potential shortcomings the software can miss. There are various types of regression models to select from depending on the hypothesis and study design, many of which fall under the tree of generalized linear models. Less commonly used models such as cox regression, negative binomial regression, and Poisson regression models can all provide potentially better alternatives in clinical research. In this review, we aim to examine regression techniques in beyond the usually reported multivariable linear and logistic regression models and focus on advanced statistical modeling and appropriate measures to account for variable selection and model behavior.

2.Afr J Prim Health Care Fam Med. 2025 Jun 3;17(2):e1-e7. doi: 10.4102/phcfm.v17i2.4934.

Understanding implementation research

Implementation research (IR) focuses on understanding and closing the gap between evidence-based interventions and practice. Key elements to evaluate include the design of the intervention itself, contextual barriers and enablers to implementation, the use of implementation strategies as well as the achievement of implementation outcomes. This article gives an overview of IR for doctoral-level researchers in the fields of family medicine and primary care. The consolidated framework for IR and socioecological model are considered for making sense of the contextual factors. A typology of implementation strategies is also described to make conceptualisation, reporting and sharing of findings easier. Standard implementation outcomes are described, such as coverage or reach, acceptability, adoption, appropriateness, feasibility, fidelity, costs and sustainability. The RE-AIM framework for implementation outcomes is described. Finally, different study designs are discussed, including hybrid effectiveness-implementation designs and approaches to reporting using the IR logic model.

3.Hypertension. 2025 Jun;82(6):971-976. doi: 10.1161/HYPERTENSIONAHA.125.24702.

Priorities for Research on Hypertension Care Delivery: A WHO Report Executive Summary

In 2024, the World Health Organization released a report on Priorities for Research on Hypertension Care Delivery; this article provides its executive summary. The World Health Organization and its technical experts formed a leadership team, developed a scope and objectives, created a thematic framework, developed a survey for each theme, and identified research priorities. The 5 themes included (1) Health care workforce for hypertension care delivery, (2) Service delivery system/models, (3) Patient retention/adherence, (4) Financing the care delivery system, and (5) Research gaps identified in the World Health Organization 2021 Hypertension Guideline. The leadership team received feedback from diverse experts through webinars and online surveys. The final report was peer-reviewed by external experts. According to postwebinar surveys, we identified 5 to 7 research priorities within each theme, totaling 29 research priorities. The 10 highest priorities were (1) Cost-effectiveness of combination therapy in low/middle-income countries, (2) A system allowing hypertension care closer to home, (3) Health system reform allowing trained community health workers to refill/initiate/titrate antihypertensive medications, (4) Health system reform allowing nurses to diagnose and treat hypertension, (5) Gaps in the medication supply chain, (6) New approaches integrating the management of hypertension and other diseases, (7) Digital approaches for improving medication adherence, (8) Optimal approaches to train health care workers, (9) Approaches to finance hypertension control programs, and (10) Implementation research on task-sharing approaches. These research priorities provide guidance to researchers, with immediate implications for substantially improve hypertension care and prevent its sequelae. We urge governments, funding agencies, and organizations to consider supporting these research topics.

4.J Glob Health. 2025 Jun 6:15:03019. doi: 10.7189/jogh.15.03019.

The potential role of AI in research priority setting exercises

To help achieve the goals of accountability and research excellence, funding organisations often utilise evidence from research priority setting exercises (RPSEs), which distil, from data gathered from relevant stakeholders, a systematic and 'objective' rank-order of research priorities. RPSEs are, however, costly and labour-intensive. Also, critics of RPSEs have highlighted certain limitations: insufficient representation of difficult-to-reach stakeholders, especially in low- and middle-income countries; a lack of genuine stakeholder engagement; wide variation in the extent to which exercises are documented; a lack of specificity in the identified priorities; and minimal impact of the priorities. Artificial intelligence (AI) tools such as ChatGPT may potentially help, valuably complementing conventional RPSEs. While the opacity of AI decision-making is a limitation, advantages include speed, affordability, and highly inclusive distillation of the vastness of existing human knowledge. We encourage research identifying the extent to which AI can replicate conventional RPSEs. We suggest that AI tools could complement conventional approaches either at the initial question generation stage or in generating supplementary insights for reflection at the data analysis stage. Also, under conditions of high existing stakeholder engagement and an extant prevalence of conventional RPSEs, AI-only studies may be valuable.

5.J Genet Couns. 2025 Jun;34(3):e70060. doi: 10.1002/jgc4.70060.

Research methodologies in genetic counseling: Grounded theory

Grounded theory was first described by Glaser and Strauss (1967, The discovery of grounded theory: Strategies for qualitative research. Aldine) as the "discovery of theory from data," and describes a group of related methodologies that share key elements of study design and data analysis. Since its inception, grounded theory has evolved into several subtypes with different philosophical underpinnings, the most common of which are post-positivism and constructivism. In post-positivist interpretive frameworks, research is guided by a series of rigorous and logically related steps to identify a single objective underlying reality. In constructivist interpretive frameworks, the researcher strives to understand the meaning participants make of a phenomenon within their social and historical context, recognizing that their own position and perspectives shape their interpretation of their participants' experiences. Grounded theory studies include multiple stages of coding, concurrent collection and analysis of data, constant comparative data analysis, theoretical sampling, and memo-writing to capture researcher reflections and evolving theoretical ideas. The outcome of the study should be a substantive theory that is grounded in the data and describes the phenomenon being studied. Publications relevant to the genetic counseling profession have used a grounded theory approach to investigate a range of topics including patient experiences, professional issues, and genetic counseling education. This article describes the theoretical underpinnings and defining characteristics of grounded theory, provides an overview of post-positivist and constructivist grounded theory approaches, and outlines key elements to consider when conducting and evaluating grounded theory research.

6.Front Psychol. 2025 Jun 26:16:1534270. doi: 10.3389/fpsyg.2025.1534270. eCollection 2025.

Statistics is not measurement: The inbuilt semantics of psychometric scales and language-based models obscures crucial epistemic differences

This article provides a comprehensive critique of psychology's overreliance on statistical modelling at the expense of epistemologically grounded measurement processes. It highlights that statistics deals with structural relations in data regardless of what these data represent, whereas measurement establishes traceable empirical relations between the phenomena studied and the data representing information about them. These crucial epistemic differences are elaborated using Rosen's general model of measurement, involving the coherent modelling of the (1) objects of research, (2) data generation (encoding), (3) formal manipulation (e.g., statistical analysis) and (4) result interpretation regarding the objects studied (decoding). This system of interrelated modelling relations is shown to underlie metrologists' approaches for tackling the prob-

lem of epistemic circularity in physical measurement, illustrated in the special cases of measurement coordination and calibration. The article then explicates psychology's challenges for establishing genuine analogues of measurement, which arise from the peculiarities of its study phenomena (e.g., higher-order complexity, non-ergodicity) and language-based methods (e.g., inbuilt semantics). It demonstrates that psychometrics cannot establish coordinated and calibrated modelling relations, thus generating only pragmatic quantifications with predictive power but precluding epistemically justified inferences on the phenomena studied. This epistemic gap is often overlooked, however, because many psychologists mistake their methods' inbuilt semantics-thus, descriptions of their study phenomena (e.g., in rating scales, item variables, statistical models)-for the phenomena described. This blurs the epistemically necessary distinction between the phenomena studied and those used as means of investigation, thereby confusing ontological with epistemological concepts-psychologists' cardinal error. Therefore, many mistake judgements of verbal statements for measurements of the phenomena described and overlook that statistics can neither establish nor analyze a model's relations to the phenomena explored. The article elaborates epistemological and methodological fundamentals to establish coherent modelling relations between real and formal study system and to distinguish the epistemic components involved, considering psychology's peculiarities. It shows that epistemically justified inferences necessitate methods for analysing individuals' unrestricted verbal responses, now advanced through artificial intelligence systems modelling natural language (e.g., NLP algorithms, LLMs). Their increasing use to generate standardised descriptions of study phenomena for rating scales and constructs, by contrast, will only perpetuate psychologists' cardinal error-and thus, psychology's crisis.

7.Am J Emerg Med. 2025 Jun 23:S0735-6757(25)00433-4. doi: 10.1016/j.ajem.2025.06.052.

A trending approach for analysis in critical care research: Bayesian statistics

Biostatistics plays an essential role in medical research. In the 20th century, frequentist statistics dominated clinical investigations. In this approach, inference is based on the probability of obtaining the observed data, assuming that the null hypothesis is either accepted or rejected. The Bayesian statistical inference is considerably different. It involves three main components: prior probability, likelihood of observed data, and posterior probability. Priors can enhance interpretation by incorporating existing knowledge. The posterior distribution provides rich interpretive value and uses probability distributions rather than single p-values. The ANDROMEDA-SHOCK trial, originally analyzed with frequentist methods, showed a clinically meaningful but not statistically significant mortality reduction with peripheral perfusion-targeted resuscitation compared to lactate-targeted therapy. A Bayesian reanalysis by Zampieri et al. revealed a consistently high posterior probability (over 90 %) that peripheral perfusion-targeted resuscitation reduces mortality at both 28 and 90 days, providing stronger evidence of its benefit. Sidebotham et al. suggested that low participant susceptibility may reduce trial power, despite effective interventions. They modeled scenarios to estimate the proportion of statistically significant results under various assumptions. Hatton et al. showed that Bayesian reasoning can improve surgical judgment by offering clearer estimates of benefit and harm. Even a well-conducted RCT on REBOA in trauma was analyzed using a Bayesian approach. This highlights the growing expectation that Bayesian statistics will be increasingly used in original investigations during the second quarter of the 21st century. Its integration into clinical research improves the interpretability of the results and bridges the gap between statistical inference and clinical reasoning.

8.Stat Med. 2025 Jun;44(13-14):e70157. doi: 10.1002/sim.70157.

Futility Monitoring in Clinical Trials

At the beginning of a phase III clinical trial, there is great optimism. After all, the phase II trial results were encouraging. Then, early data from the phase III trial trend in the wrong way, but there is still an opportunity for the trend to reverse and become statistically significant by the end. At what point does optimism become denial of reality? How do we decide when a clinical trial is futile? What does futility even mean? This tutorial reviews different concepts and tools for evaluating futility, including conditional and predictive power, reverse conditional power, predicted interval plots, revised unconditional power, and beta spending functions.

9.Arh Hig Rada Toksikol. 2025 Jun 30;76(2):79-86. doi: 10.2478/aiht-2025-76-3977.

Theory of random measurement errors: concepts, uses, and misuses

We present an overview of the theory of random measurement errors, focusing on the underlying concepts rather than on a strict mathematical formulation. Although the related literature is extensive, one can frequently encounter partly or completely wrong usages of the theory. In many cases, these misuses stem from incomplete understanding of the basic principles. Our presentation is based on a discussion on similarities and differences between this theory and statistics, as they are used differently in analysing the results of an experiment. In statistics, the central parameters are the mean and standard deviation, which are related to a given statistical distribution. In the theory of random measurement errors, the mean has a different meaning, representing the best estimate of the true value of a measured quantity. The second parameter of importance is not standard deviation but the uncertainty of the mean, which sets the probability that the true value lies in a given interval around the mean. These conceptual differences are seldom pointed out, which sometimes results in doubtful or wrong analyses and presentations of measurement results. We illustrate our theoretical considerations with examples of proper and improper use of the theory.

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۰۲۱-۸۸۹۲۹۸۸۸

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