

# Methodological Rigor in Health Research: Ensuring the Best Approach to Address Clinical and Public Health Objectives

Heru Santoso Wahito Nugroho<sup>1</sup>

<sup>1</sup>Department of Health, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Correspondence: **Heru Santoso Wahito Nugroho**: Jl. Pucang Jajar Tengah 56, Surabaya, Indonesia; heruswn@gmail.com

## ABSTRACT

In health research, the credibility and clinical relevance of scientific evidence are fundamentally determined by how well research methods are designed, justified, and reported. The methods section serves as the critical link between research objectives and the evidence generated to address them. However, misalignment between objectives and methodological approaches remains a common concern, often resulting in biased findings, limited applicability, and compromised decision-making in clinical and public health contexts. This perspective emphasizes that methodological rigor must be understood primarily as the alignment between research objectives and the chosen methods. The “best” method is not necessarily the most advanced, but the one most appropriate for answering a clearly defined clinical or public health question. Through conceptual discussion and illustrative examples across qualitative, experimental, and observational research, this paper highlights how inappropriate methodological choices can undermine validity, distort interpretations, and weaken the applicability of findings. The perspective further outlines a systematic approach to achieving alignment, beginning with the precise formulation of research objectives and followed by the careful selection and justification of study design, population, data collection procedures, and analytical strategies. Transparency in reporting and adherence to ethical standards are emphasized as essential components in demonstrating this alignment and ensuring reproducibility. As a key message to authors, this paper underscores that methodological decisions must not be driven by convention or convenience, but by their capacity to directly and reliably answer the research question. Failure to ensure such alignment risks producing evidence that is not fit for purpose, with potential implications for patient care and health policy. Conversely, a well-aligned and transparently reported methodological framework strengthens the validity, credibility, and impact of research, thereby supporting evidence-based healthcare and improved health outcomes.

**Keywords:** health research; methodological rigor; research objectives; study design; clinical validity; transparency; reproducibility

## INTRODUCTION

In health research, the credibility of scientific evidence is fundamentally determined by how well the research methods are designed and reported [1,2]. The methods section is not merely a procedural requirement; it represents the logical bridge between research objectives and the evidence generated to address them. A clearly articulated objective without an appropriately aligned methodological approach risks producing findings that are difficult to interpret, apply, or trust in clinical and public health contexts [3].

The increasing emphasis on evidence-based practice further amplifies the importance of methodological rigor. Clinicians, policymakers, and other health professionals rely on published research to inform decisions that directly affect patient outcomes and population health. Consequently, the methods employed in a study must not only be scientifically sound but also demonstrably appropriate for answering the specific research question posed. Misalignment between objectives and methods may lead to biased conclusions, reduced clinical applicability, and ultimately compromised decision-making [4].

Despite the centrality of methods in determining research quality, weaknesses in methodological justification and reporting remain common in submitted manuscripts [5]. These include the use of inappropriate study designs, insufficient detail for replication, and lack of clarity in linking methods to research objectives. Such issues highlight the need for a more deliberate and reflective approach to writing the methods section.

This perspective underscores the principle that the methods described in a manuscript must represent the best possible approach to answering the stated research objectives. Through a structured discussion of what constitutes an appropriate method, why such appropriateness matters in health research, and how methods should be designed and reported, this paper aims to guide authors in strengthening the methodological integrity of their work.

## ALIGNMENT BETWEEN METHODS AND OBJECTIVES IN HEALTH RESEARCH

In the context of health research, the “best” method is not necessarily the most sophisticated or technologically advanced, but the one most appropriate for answering a clearly defined clinical or public health question. The key indicator of methodological quality lies in the alignment between the research objective and the study design, ensuring that the findings are both scientifically sound and clinically meaningful [6].

For example, when the objective is to understand patients' lived experiences with chronic illness or long-term therapy, qualitative approaches such as in-depth interviews or focus group discussions are more appropriate than structured quantitative surveys. These methods allow for a deeper exploration of patient perspectives, which are critical for patient-centered care and shared decision-making. Conversely, when evaluating the effectiveness of an intervention, randomized controlled trials or well-designed quasi-experimental studies provide stronger evidence to inform clinical practice.

Methodological appropriateness in healthcare is fundamentally a matter of alignment between the research objectives and the approach used to achieve them [7]. Research findings in this field are not merely academic outputs; they directly inform clinical decision-making, practice guidelines, and health policy [8]. When the chosen methods are not properly aligned with the intended objectives, the resulting evidence may fail to answer the research question accurately, thereby undermining its clinical relevance and utility [9].

A mismatch between objectives and methods can lead to biased estimates of treatment effects, inaccurate risk assessments, and conclusions that do not truly reflect the phenomena under investigation [10]. In turn, such weaknesses may translate into suboptimal or even harmful decisions in patient care and public health interventions. For this reason, methodological rigor in healthcare must be understood not only as a technical requirement but as a professional and ethical obligation to ensure that research outcomes are valid, reliable, and fit for purpose [11-13].

For example, when the objective of a study is to determine causal relationships between an intervention and health outcomes, the use of experimental or quasi-experimental designs is essential. Employing purely descriptive or cross-sectional approaches in this context fails to adequately address the causal question, resulting in evidence that is insufficient for guiding clinical practice. Similarly, in epidemiological studies aimed at identifying risk factors, inappropriate sampling strategies or inadequate control of confounding variables may prevent the study from

accurately capturing the relationships it seeks to examine. These considerations highlight a central principle in health research: the strength, validity, and applicability of evidence depend not only on how well a study is conducted, but on whether its methods are specifically chosen to answer its stated objectives.

Ensuring that research methods are appropriately aligned with study objectives requires a deliberate and systematic approach that begins at the design stage and continues through to reporting [14-16]. The first and most critical step is the precise formulation of the research objective, as the clarity and specificity of this objective will determine the suitability of subsequent methodological choices. Authors must explicitly identify whether their objective is exploratory, descriptive, causal, predictive, or evaluative, as each of these aims necessitates a different methodological approach.

Once the objective is clearly defined, the selection of study design, population, and analytical strategy must be guided by their ability to directly answer the research question [17]. For example, objectives that seek to determine the effectiveness of an intervention require experimental or quasi-experimental designs, whereas objectives focused on understanding patient experiences are better addressed through qualitative methods. Similarly, in epidemiological research, the choice of sampling strategy and control of confounding variables must be tailored to ensure that the relationships of interest can be accurately identified.

Alignment is further strengthened by providing explicit justification for each methodological decision. Authors should clearly articulate not only what methods were used, but why those methods represent the most appropriate approach for achieving the stated objectives [18]. This includes explaining the selection of study settings, inclusion and exclusion criteria, measurement instruments, and analytical techniques in relation to the research aims. In clinical studies, for instance, justification should encompass sample size determination, randomization procedures, and strategies to minimize bias, while observational studies should demonstrate rigorous approaches to controlling confounding and systematic error.

In addition, transparency in reporting plays a crucial role in demonstrating this alignment. A comprehensive and clearly structured methods section—covering study design, population, data collection procedures, and analysis—enables readers to assess whether the chosen methods are indeed capable of addressing the research objectives. Ethical considerations, including informed consent, ethical approval, and patient safety, must also be integrated into this framework, as they are inseparable from methodological rigor in health research.

Ultimately, achieving alignment between methods and objectives is not a single step but a continuous process of methodological reasoning, justification, and transparent reporting. Such alignment ensures that the evidence generated is not only scientifically robust but also clinically meaningful and applicable to real-world healthcare settings.

## MESSAGE TO AUTHORS

We emphasize that the methods section is a critical determinant of the scientific and clinical value of a manuscript, primarily because it demonstrates whether the chosen approach is truly capable of answering the stated research objectives. Authors must ensure that every methodological decision is not only explicitly justified but also directly aligned with clinically relevant research aims. A method that is well-executed but poorly matched to the objective ultimately fails to produce meaningful or actionable evidence [19].

Method selection, therefore, should never be driven by convention, familiarity, or convenience [20]. Instead, it must be guided by a clear understanding of what is required to answer the research question accurately and reliably. Authors are expected to demonstrate this alignment by explaining how their chosen design, population, measurements, and analytical strategies collectively serve the stated objectives. Without such alignment, even technically rigorous studies risk producing findings that are difficult to interpret or apply in clinical and public health contexts.

We further stress that transparency and completeness in reporting are essential to making this alignment visible and assessable. Methods must be described in sufficient detail to allow replication and critical appraisal [21], particularly given their implications for patient care and health systems. Authors should also acknowledge the limitations of their methodological choices, including potential sources of bias and constraints on generalizability, as part of an honest appraisal of how well the methods address the intended objectives.

Neglecting the alignment between methods and objectives not only weakens the scientific contribution of a manuscript but may also lead to misleading conclusions with downstream consequences for clinical practice and public health decision-making. Conversely, a well-aligned, clearly justified, and transparently reported methodological framework ensures that research findings are both valid and fit for purpose, thereby strengthening their contribution to evidence-based healthcare.

## CONCLUSION

In health research, the methods section is not a peripheral component but the foundation upon which credible and clinically relevant evidence is built. Authors are required not only to select appropriate methods but also to articulate them in a clear, systematic, and justified manner. By ensuring that methodological choices represent the best possible approach to addressing clinical and public health objectives, researchers contribute to stronger evidence, better decision-making, and ultimately improved patient outcomes.

## Ethical consideration, competing interest and source of funding

- As this article is a perspective and does not involve primary data collection from human or animal participants, ethical approval was not required.
- There is no conflict of interest related to this publication.
- Source of funding is authors.

## REFERENCES

1. Nugroho HSW, Jeniawaty S, Karno K, Badiah A, Susilaningrum R, Al Mamun A. Action Research as an Ideal Method for Introducing Research Products in the Field of Public Health. *Health Notions*. 2024 Feb 28;8(2):49-50.
2. Jones KR, Gwynn EP, Teeter AM. Quantitative or qualitative: Selecting the right methodological approach for credible evidence. *Journal of Human Sciences & Extension*. 2019;7(2):61-87.
3. Nyirenda L, Kumar MB, Theobald S, Sarker M, Simwinga M, Kumwenda M, Johnson C, Hatzold K, Corbett EL, Sibanda E, Taegtmeier M. Using research networks to generate trustworthy qualitative public health research findings from multiple contexts. *BMC Medical Research Methodology*. 2020 Jan 21;20(1):13.
4. Cross JL, Choma MA, Onofrey JA. Bias in medical AI: implications for clinical decision-making. *PLOS Digital Health*. 2024 Nov 7;3(11):e0000651.
5. Piran MJ, Tran NH. Enhancing research methodology and academic publishing: A structured framework for quality and integrity. *arXiv Preprint arXiv:2412.05683*. 2024 Dec 7.

6. Johnson JL, Adkins D, Chauvin S. A review of the quality indicators of rigor in qualitative research. *American Journal of Pharmaceutical Education*. 2020 Jan 1;84(1):7120.
7. Cruz Rivera S, Kyte DG, Aiyegbusi OL, Keeley TJ, Calvert MJ. Assessing the impact of healthcare research: a systematic review of methodological frameworks. *PLoS Medicine*. 2017 Aug 9;14(8):e1002370.
8. Sarkies MN, Bowles KA, Skinner EH, Haas R, Lane H, Haines TP. The effectiveness of research implementation strategies for promoting evidence-informed policy and management decisions in healthcare: a systematic review. *Implementation Science*. 2017 Nov 14;12(1):132.
9. Shaheen N, Shaheen A, Ramadan A, Hefnawy MT, Ramadan A, Ibrahim IA, Hassanein ME, Ashour ME, Flouty O. Appraising systematic reviews: a comprehensive guide to ensuring validity and reliability. *Frontiers in Research Metrics and Analytics*. 2023 Dec 21;8:1268045.
10. Austin PC. Double propensity-score adjustment: a solution to design bias or bias due to incomplete matching. *Statistical Methods in Medical Research*. 2017 Feb;26(1):201-22.
11. Han H, Youm J, Tucker C, Teal CR, Rougas S, Park YS, J. Mooney C, L. Hanson J, Berry A. Research methodologies in health professions education publications: breadth and rigor. *Academic Medicine*. 2022 Nov;97(Supplement\_2):S54-62.
12. Harley B, Cornelissen J. Rigor with or without templates? The pursuit of methodological rigor in qualitative research. *Organizational Research Methods*. 2022 Apr;25(2):239-61.
13. Moura A, Fraga S, Ferreira PD, Amorim M. "Are we still at this point?:" Persistent misconceptions about the adequacy, rigor and quality of qualitative health research. *Frontiers in Public Health*. 2025 Apr 22;13:1586414.
14. Adeoye MA. Mastering the basics: A guide to research methodology for effective writing and publication. *Chalim Journal of Teaching and Learning*. 2024 Sep 30;4(1):30-41.
15. Almusaed A, Almssad A, Yitmen I. Introduction to Research Methodology. In *Practice of Research Methodology in Civil Engineering and Architecture: A Comprehensive Guide*. 2025 Oct 20 (pp. 5-33). Cham: Springer Nature Switzerland.
16. Abutabenjeh S, Jaradat R. Clarification of research design, research methods, and research methodology: A guide for public administration researchers and practitioners. *Teaching Public Administration*. 2018 Oct;36(3):237-58.
17. Asenahabi BM. Basics of research design: A guide to selecting appropriate research design. *International Journal of Contemporary Applied Researches*. 2019 May;6(5):76-89.
18. Quezada LE, Cordova FM, Palominos P, Godoy K, Ross J. Method for identifying strategic objectives in strategy maps. *International Journal of Production Economics*. 2009 Nov 1;122(1):492-500.
19. Saharan VA, Kulhari H, Jadhav H, Pooja D, Banerjee S, Singh A. Introduction to research methodology. In *Principles of Research Methodology and Ethics in Pharmaceutical Sciences*. 2024 Aug 30 (pp. 1-46). CRC Press.
20. Koivu KL, Hinze AM. Cases of convenience? The divergence of theory from practice in case selection in qualitative and mixed-methods research. *PS: Political Science & Politics*. 2017 Oct;50(4):1023-7.
21. Nuijten MB. Practical tools and strategies for researchers to increase replicability. *Developmental Medicine & Child Neurology*. 2019 May;61(5):535-9.