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A Guide to a Mixed-Methods Approach to Healthcare Research

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Definition: A mixed-methods approach combines qualitative and quantitative research methodologies to provide a comprehensive understanding of complex social phenomena in healthcare. This approach leverages the strengths of both methodologies to address research questions that cannot be fully answered by a single method. While quantitative data offer measurable patterns and generalizability, qualitative research provides critical insights into the human experiences, cultural contexts, and systemic factors that underlie these patterns, and such elements are often missed by purely statistical analyses. Notably, qualitative components can uncover why interventions succeed or fail in real-world settings, adding explanatory power to quantitative results. By integrating numerical data analysis with in-depth contextual insights, mixed-methods research enables researchers to explore, explain, and generalize findings in healthcare settings more holistically than either method could achieve alone.

Keywords: mixed-methods research; healthcare; qualitative research; quantitative research; social phenomena; triangulation

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Academic Editor: Harry H. X. Wang

Received: 24 February 2025
Revised: 25 March 2025
Accepted: 9 April 2025
Published: 11 April 2025

Citation: Rana, K.; Chimoriya, R. A Guide to a Mixed-Methods Approach to Healthcare Research. *Encyclopedia* **2025**, *5*, 51. https://doi.org/10.3390/encyclopedia5020051

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1. Background

Mixed-methods research (MMR) has emerged as a highly effective approach in healthcare research, particularly for investigating complex social phenomena such as patient experiences, healthcare disparities, and organizational behavior [1,2]. By integrating qualitative and quantitative data collection and analysis within a single study or across multiple studies, MMR enables researchers to address multifaceted research questions that cannot be adequately explored using a single methodological approach [3]. This multi-focus approach is especially valuable in healthcare, where understanding both measurable outcomes (e.g., clinical metrics and patient satisfaction scores) and the underlying human experiences (e.g., patient narratives and provider perspectives) is critical for developing holistic solutions to healthcare challenges [4].

The integration of qualitative and quantitative methods allows researchers to triangulate findings, thereby enhancing the validity, reliability, and depth of the results [5]. Quantitative methods, such as surveys and statistical analyses, are adept at identifying patterns, trends, and correlations within large datasets. A quantitative study might reveal that patients from marginalized communities report lower satisfaction with healthcare services. However, quantitative data alone cannot explain why these disparities exist

or how they manifest in real-world settings. This is where qualitative methods, such as interviews, focus groups, and ethnographic observations, come into play [6]. Qualitative data provide rich, contextual insights into the lived experiences of patients and providers, offering explanations for the patterns identified through quantitative analysis [6,7].

This synergy between qualitative and quantitative methods makes MMR particularly well suited for exploring complex issues in healthcare. In particular, while studying patient satisfaction, quantitative surveys can measure overall satisfaction levels, while qualitative interviews can uncover the specific factors influencing satisfaction, such as communication with providers or wait times [6]. Similarly, in evaluating the impact of policy changes, quantitative data can assess changes in healthcare utilization rates, while qualitative data can reveal how patients and providers perceive and adapt to these changes [8].

Moreover, MMR is increasingly being used to address healthcare disparities, where understanding both the statistical prevalence of disparities and the social, cultural, and structural factors driving them is essential [9]. By combining quantitative data on health outcomes with qualitative insights into patient and provider experiences, MMR provides a comprehensive understanding of the root causes of disparities and informs the development of targeted interventions across diverse populations [7,10,11]. By leveraging the strengths of both qualitative and quantitative approaches, MMR enables researchers to generate actionable insights that can improve healthcare delivery, inform policy, and ultimately enhance patient outcomes [12].

2. Historical Background and Development

The origins of mixed-methods research can be traced back to the mid-20th century, a period when social scientists began to critically examine the limitations of relying exclusively on either qualitative or quantitative methods [13]. Qualitative methods, while rich in contextual detail, were often criticized for their lack of generalizability and potential subjectivity. Conversely, quantitative methods, though robust in measuring patterns and relationships, were seen as insufficient for capturing the depth and complexity of human experiences. This recognition led to the emergence of MMR to bridge the gap between these two approaches, combining their strengths to address research questions more comprehensively [14]. One of the earliest and most influential contributions to the development of MMR was the work of Campbell and Fiske, who introduced the concept of triangulation [14]. Triangulation refers to the use of multiple methods or data sources to validate findings, thereby enhancing the credibility and robustness of research outcomes [15]. This idea laid the groundwork for the integration of qualitative and quantitative methods, encouraging researchers to view these approaches as complementary rather than mutually exclusive. Over time, MMR evolved into a distinct methodology, supported by theoretical frameworks and design typologies that provided researchers with structured guidelines for effectively combining methods [3].

In healthcare, the adoption of MMR gained significant momentum in the 1990s, driven by the growing complexity of healthcare systems and the need to address multifaceted challenges such as patient-centered care, healthcare disparities, and the implementation of evidence-based practices [1]. Healthcare researchers recognized that understanding these issues required not only measurable data on outcomes but also insights into the lived experiences of patients, providers, and policymakers. While quantitative data could reveal trends in patient satisfaction or treatment adherence, qualitative data are essential for understanding the underlying reasons for these trends, such as cultural beliefs, communication barriers, or systemic inefficiencies [7,16].

The development of frameworks such as Creswell and Plano Clark's typology of mixed-methods designs marked a significant milestone in the evolution of MMR [1]. Their

typology categorized mixed-methods designs into three main types: convergent parallel, explanatory sequential, and exploratory sequential. These designs provide researchers with clear pathways for integrating qualitative and quantitative methods, either by collecting and analyzing data simultaneously (convergent parallel), using qualitative data to explain quantitative findings (explanatory sequential), or using qualitative data to inform the development of quantitative instruments (exploratory sequential). This structured approach makes MMR more accessible and applicable to a wide range of research contexts, including healthcare [8].

Today, MMR is widely recognized as a powerful tool in healthcare research, enabling researchers to address complex questions that require both breadth and depth of understanding. In patient-centered care research, MMR has been used to combine patient satisfaction surveys with in-depth interviews, providing a holistic view of patient experiences and preferences [4]. Similarly, in implementation science, MMR has been instrumental in evaluating the adoption of evidence-based practices, using quantitative data to measure outcomes and qualitative data to explore barriers and facilitators to implementation [17]. The continued evolution of MMR has also been supported by advancements in data analysis techniques and tools, such as joint displays and meta-inference, which facilitate the integration of qualitative and quantitative findings [18]. These innovations have further strengthened the methodological rigor of MMR, making it an indispensable approach for addressing the dynamic and multifaceted challenges of modern healthcare systems [19].

3. Design of Mixed-Methods Research

3.1. Types of Mixed-Methods Designs

Mixed-methods research encompasses various designs, each tailored to specific research questions and objectives, with the three most common being convergent parallel, explanatory sequential, and exploratory sequential, as outlined in Table 1 [20]. In the convergent parallel design, qualitative and quantitative data are collected simultaneously and analyzed independently, after which the results are compared or merged to provide a comprehensive understanding of the research problem [18]. The explanatory sequential design follows a two-phase approach, beginning with the collection and analysis of quantitative data to identify patterns or trends, followed by qualitative data collection to explain or elaborate on the quantitative findings [21]. Conversely, the exploratory sequential design starts with qualitative data collection to explore a phenomenon, followed by quantitative data collection to generalize the findings to a larger population [22]. Each design has its strengths and limitations, and the choice of design depends on the research question, context, and available resources [23].

Table 1. Types of mixed-methods designs employed in healthcare research.

Design	Convergent Parallel Design	Explanatory Sequential Design	Exploratory Sequential Design
Details	Qualitative and quantitative data are collected simultaneously and analyzed independently before merging results.	Quantitative data are collected and analyzed first, followed by qualitative data to explain the findings.	Qualitative data are collected first to explore a phenomenon, followed by quantitative data to generalize findings.
Research Question	It seeks to understand a phenomenon from both qualitative and quantitative perspectives simultaneously.	It aims to explain or elaborate on quantitative results using qualitative insights.	It qualitatively explores a phenomenon in-depth before quantifying the findings.

Table 1. *Cont.*

Design	Convergent Parallel Design	Explanatory Sequential Design	Exploratory Sequential Design
Methods	Data collection occurs in parallel using surveys, experiments, interviews, or focus groups. Both datasets are analyzed independently using statistical and thematic analysis, and results are merged or compared to identify similarities, differences, or complementarities.	The first phase involves collecting and analyzing quantitative data (e.g., surveys, secondary data analysis, and experiments) to identify patterns or relationships. The second phase consists of qualitative data collection (e.g., interviews and focus groups) to provide deeper explanations for the quantitative results.	The first phase involves qualitative data collection (e.g., in-depth interviews, ethnography, and focus groups) to explore key themes or generate hypotheses. The second phase uses quantitative methods (e.g., surveys, structured observations, and experimental designs) to test or generalize findings to a larger population.
Context	This is suitable when both types of data provide complementary insights into a research problem.	This is useful when quantitative data need further explanation through qualitative insights.	This is appropriate when little is known about a phenomenon and qualitative insights are needed before generalization.
Resources	These require expertise in both qualitative and quantitative analysis; data collection must be well coordinated.	These require time for sequential data collection and expertise in both methodologies.	These demand qualitative expertise first, followed by quantitative skills for validation.
Key Strengths	These provide a comprehensive understanding; they allow for a direct comparison of different data types.	These offer deeper insights into quantitative findings; helps clarify unexpected results.	These capture rich qualitative insights before quantification; they are useful for theory development.
Key Limitations	These require substantial coordination; there is potential difficulty in integrating data.	These are time-consuming due to sequential phases; a qualitative follow-up may not fully explain the results.	Initial qualitative findings may not be easily generalizable; these require expertise in both methods.

3.2. Formulating Research Questions for Mixed-Methods Studies

Mixed-methods research questions often include both qualitative and quantitative components, reflecting the dual nature of the approach. For instance, a study on healthcare disparities might ask, "What are the racial and ethnic disparities in access to care (quantitative), and how do patients from different backgrounds perceive these disparities (qualitative)?" Designing effective research questions is critical for the success of MMR. Research questions should be clear, focused, and aligned with the chosen mixed-methods design [1,3,4]. A convergent parallel design might ask, "What are the patterns of patient satisfaction, and how do patients describe their experiences?" On the other hand, an explanatory sequential design might ask, "How do patient demographics influence satisfaction, and what factors explain these differences?" An exploratory sequential design might ask, "What are the key themes in patient experiences with care, and how do these themes relate to patient satisfaction scores?".

4. Data Collection Technique

Mixed-methods research employs a range of data collection techniques, including surveys, interviews, focus groups, and observational methods, selected based on the research design and objectives. Quantitative techniques, such as structured surveys, administrative data, and clinical records, provide numerical data that can be analyzed statistically. Qualitative techniques, including in-depth interviews, focus groups, and ethnographic observations, capture rich, contextual data that offer insights into participants' perspectives and experiences [6]. Integrating both types of data is a core aspect of mixed-methods

research, where quantitative surveys can be followed by qualitative interviews to explore themes in greater depth [24]. Further details about these techniques are provided in Table 2.

Table 2. Data collection techniques in mixed-methods research.

Data Collection Techniques	Description	Examples of Data Collection Approach
Quantitative Data Collection	This involves methods that yield numerical data suitable for statistical analysis. These techniques are designed to measure variables and quantify relationships between them. They provide objective, reliable, and generalizable data that can be used to test hypotheses and identify patterns [7,25].	• Structured surveys: Closed-ended questions, scales, and rating systems (e.g., Likert scales). • Administrative data: Existing data from healthcare systems, insurance records, or patient demographics. • Clinical records: Electronic health records or patient files providing numeric health data (e.g., blood pressure readings and lab results).
Qualitative Data Collection	This technique focuses on gathering non-numerical, rich, and contextual data that capture individuals' thoughts, experiences, and behaviors. This approach helps uncover meanings, themes, and personal insights that cannot be measured quantitatively [6,26].	• In-depth interviews: Semi-structured or unstructured interviews that allow participants to elaborate on their experiences. • Focus groups: Group discussions that provide diverse perspectives on a given topic. • Ethnographic observations: Direct observation of participants in their natural setting, often accompanied by field notes.
Integration of Data Collection	A defining feature of mixed-methods research involves collecting both quantitative and qualitative data to provide a holistic view of the research problem. Integration can occur simultaneously (data collected at the same time) or sequentially (one method follows another) [12,27].	• Surveys followed by interviews: Quantitative data (e.g., satisfaction surveys) can be followed by qualitative interviews to delve deeper into specific themes (e.g., reasons behind satisfaction scores). • Data triangulation: Multiple data sources (e.g., survey, interview, and observation) can be used to strengthen the validity of findings and provide a comprehensive view of the research question.

5. Data Analysis Techniques

Data analysis in mixed-methods research involves the integration of qualitative and quantitative data to provide a more comprehensive understanding of complex research questions. A defining feature of MMR is the integration of qualitative and quantitative data, which can occur at various stages, including data collection, analysis, and interpretation [8,27]. During data collection integration, researchers gather qualitative and quantitative data either simultaneously or sequentially, ensuring that the methods complement each other and enhance the robustness of the findings [27]. In data analysis integration, techniques such as joint displays, triangulation, and meta-inference are employed to systematically combine qualitative and quantitative findings, allowing for a more nuanced interpretation of the results [8]. Finally, interpretation integration involves synthe-

sizing the combined data to generate deeper insights, ensuring that qualitative narratives contextualize statistical patterns and vice versa [28].

The analysis of quantitative data in MMR typically involves statistical techniques such as descriptive statistics, regression analysis, and factor analysis. These methods help researchers identify trends, relationships, and patterns that contribute to a broader understanding of the research problem [28]. Statistical modeling further enables hypothesis testing and the generalizability of findings across populations. Conversely, qualitative data are analyzed using methods such as thematic analysis, grounded theory, and content analysis, which allow researchers to identify emerging themes, interpret narratives, and understand the underlying motivations and experiences of participants [6]. These approaches add depth and contextual richness to the study by capturing perspectives that cannot be quantified [6,29]. A summary of the key methodologies used in mixed-methods research are presented in Figure 1.

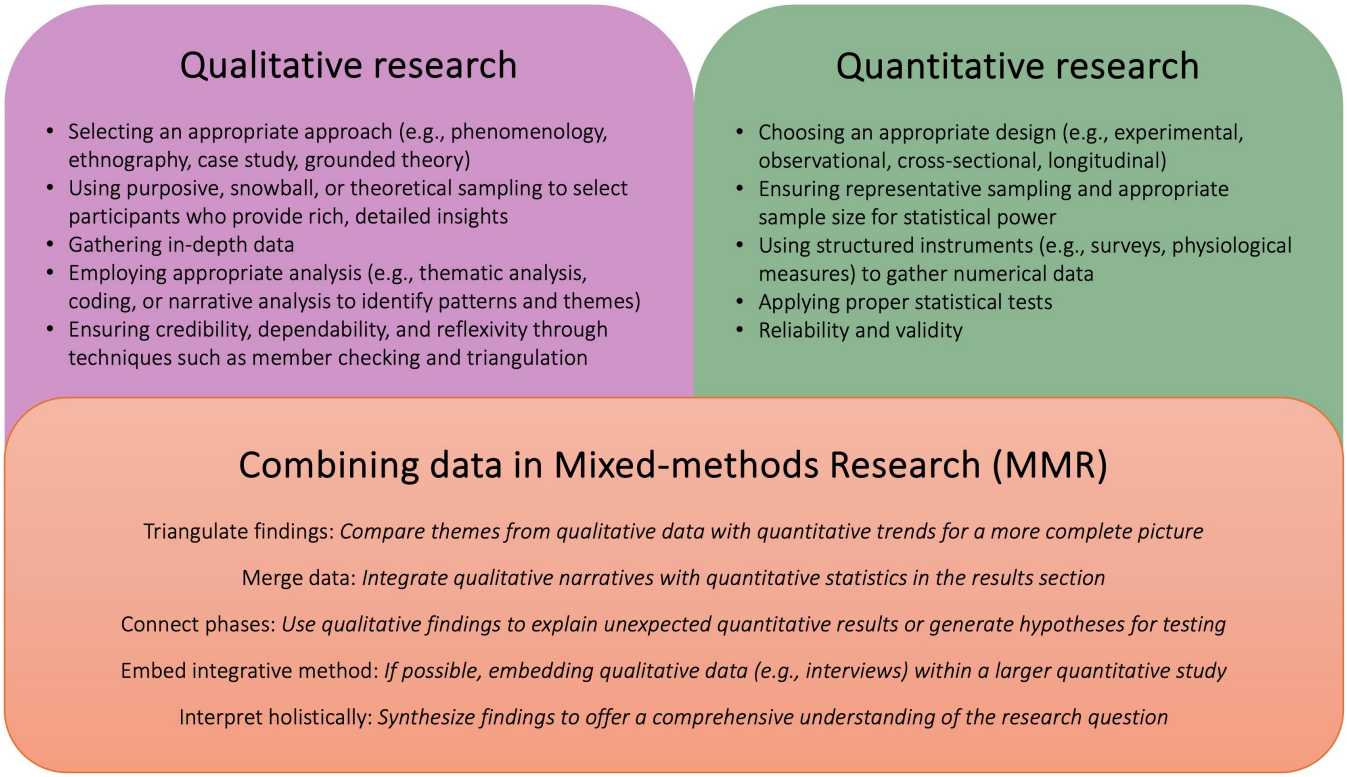


Figure 1. Summary of key methodological approaches in mixed-methods research.

To enhance the clarity and accessibility of integrated findings, visualization techniques such as joint displays and concept maps are employed [30]. These tools help researchers effectively present the relationships between qualitative and quantitative data, making the insights more interpretable for both academic and non-academic stakeholders. By visually mapping connections between datasets, researchers can illustrate complex interactions and ensure that findings are communicated in a meaningful way [30]. Table 3 presents the 20-Step Mixed-methods Integration & Rigorous Analytical Guidelines (20-MIRAGE). This stepwise analytical guide for mixed-methods research was developed based on a comprehensive literature review on mixed-methods design. It details a systematic approach to integrating quantitative and qualitative data from initial processing to final validation during mixed-methods analysis.

Table 3. The 20-step framework developed for mixed-methods research analysis.

20-Step Mixed-Methods Integration & Rigorous Analytical Guidelines (20-MIRAGE)
1. Begin by thoroughly cleaning your quantitative dataset, addressing missing values and coding variables systematically to ensure data integrity before analysis.
2. Calculate comprehensive descriptive statistics (measures of central tendency, dispersion, and distribution) to establish foundational understanding of your quantitative data patterns.
3. Select appropriate inferential tests (parametric or non-parametric based on data distribution) to examine relationships and test hypotheses within your quantitative data.
4. Conduct coding of qualitative data through multiple close readings of transcripts, applying both theory-driven and emergent coding approaches.
5. Systematically group codes into meaningful themes through iterative analysis, constantly verifying their accuracy against raw qualitative data.
6. Apply specialized qualitative methodologies (e.g., grounded theory and phenomenology) when deeper theoretical or experiential understanding is required by your research questions.
7. Develop a clear integration strategy early, specifying how and when quantitative and qualitative components will interact throughout your study design.
8. In convergent designs, deliberately compare quantitative and qualitative results side by side to identify areas of alignment, divergence, or complementary insights.
9. When using explanatory sequential designs, let the quantitative findings guide your qualitative sampling and questioning to explain significant or unexpected results.
10. For exploratory sequential designs, carefully translate qualitative discoveries into well-operationalized quantitative measures for subsequent testing.
11. Create tailored joint displays that visually represent the relationship between your quantitative and qualitative findings in a format suited to your research design.
12. Design convergent joint displays to facilitate direct comparison between numerical results and qualitative themes through adjacent presentation.
13. Structure explanatory joint displays to show how qualitative findings elucidate quantitative results through paired columns of evidence.
14. Organize exploratory joint displays to demonstrate how qualitative insights informed the development of subsequent quantitative measures.
15. Dedicate focused analysis to deriving meta-inferences that synthesize insights from both datasets into higher-order conclusions.
16. Systematically compare findings across methods, documenting points of convergence, complementarity, and contradiction with equal attention.
17. Pay particular attention to areas where methods agree, as these convergent findings typically represent the most robust results.
18. Investigate methodological or substantive reasons for any divergences between quantitative and qualitative findings, as these often yield important insights.
19. Craft your final interpretation to weave together both methodological strands into a coherent, multi-dimensional understanding of the phenomenon.
20. Implement multiple validation strategies (member checking, peer review, and audit trails) to ensure the credibility and trustworthiness of your integrated findings.

Meta-Inference in Mixed-Methods Research

Meta-inference is a critical process in MMR that synthesizes qualitative and quantitative findings into a coherent, higher-order interpretation, moving beyond simple triangulation. It helps to examine how datasets complement, contradict, or expand upon one another [31]. This integration begins with a systematic comparison of results, identifying points of convergence that reinforce conclusions, as well as discrepancies that

may reveal deeper complexities [31,32]. Qualitative findings can contextualize statistical patterns, while quantitative data may validate or challenge emerging themes, allowing researchers to refine interpretations iteratively. They can be categorized into global meta-inferences, which extend beyond the studied sample to inform broader research, practice, and policy, and specific meta-inferences, which are directly relevant to the studied population [33]. Within these, five subtypes exist: (i) relational meta-inferences, which identify relationships between constructs; (ii) predictive meta-inferences, which forecast future patterns; (iii) causal meta-inferences, which establish cause–effect relationships; (iv) comparative meta-inferences, which provide integrated yet surface-level insights; and (v) elaborative meta-inferences, which generate deeper, latent understandings by synthesizing contextual information.

The strength of meta-inference lies in its ability to enhance the study's rigor by merging diverse forms of evidence, thereby reducing methodological biases and strengthening validity. Beyond verification, meta-inference facilitates theory development by uncovering nuanced relationships that single-method approaches might miss, while also ensuring practical relevance by bridging empirical findings with real-world applications [33]. Ultimately, it transforms MMR from a simple combination of methods into a robust framework for generating comprehensive, actionable knowledge that is both statistically grounded and richly contextualized.

6. Applications in Healthcare

Mixed-methods research has been extensively applied across various healthcare domains, providing a more comprehensive and nuanced understanding of complex issues by integrating qualitative and quantitative data. In patient-centered care, MMR enhances the evaluation of healthcare services by combining standardized patient satisfaction surveys with in-depth interviews, allowing researchers to capture both numerical trends and rich experiential narratives [34,35]. This dual approach not only identifies gaps in service delivery but also provides insights into patient expectations, communication barriers, and personalized care preferences, which are often overlooked in purely quantitative studies [36,37].

In healthcare disparities, MMR is particularly valuable as it enables researchers to measure disparities in healthcare access, treatment, and outcomes while simultaneously exploring the underlying social, economic, and cultural determinants that drive these inequities. By integrating quantitative epidemiological data with qualitative accounts from marginalized populations, MMR helps uncover systemic biases, discriminatory practices, and patient–provider dynamics that contribute to differential health outcomes. This methodological approach informs the development of targeted interventions and policy reforms aimed at reducing healthcare inequities [37].

Furthermore, in implementation science, MMR plays a critical role in assessing the adoption, effectiveness, and sustainability of evidence-based practices within real-world healthcare settings [38]. While quantitative methods measure implementation outcomes such as adherence rates, patient health metrics, and cost-effectiveness, qualitative research provides essential insights into the contextual barriers and facilitators influencing the success or failure of these interventions [38–41]. By capturing the perspectives of healthcare providers, administrators, and patients, MMR enhances the understanding of why certain practices succeed in one setting but fail in another, ultimately improving the translation of research findings into clinical practice and health policy [40,41].

Despite high applicability, MMR presents some notable challenges and limitations that researchers must navigate. One significant challenge is the complexity and resource intensity of conducting MMR. Compared to single-method studies, MMR requires expertise

in both qualitative and quantitative methodologies, making it resource-intensive in terms of time, funding, and skill sets [42,43]. Additionally, integration challenges can arise when combining qualitative and quantitative data, particularly when the findings from each method are divergent or contradictory. Reconciling these differences to form a cohesive and comprehensive understanding of the research problem can be difficult and may require sophisticated analytical techniques [43]. This may be further compounded in the case of interdisciplinary or multidisciplinary research [44]. A distinct limitation in qualitative components involves potential response bias, where participants may provide socially desirable answers or conceal their true perceptions about healthcare interventions. This could stem from power dynamics between researchers and participants, cultural norms discouraging criticism, or fear of repercussions [45]. Such distortions may lead researchers to develop interventions based on inaccurate representations of stakeholder needs, ultimately reducing the effectiveness of implemented solutions. Triangulation through multiple data sources (e.g., combining interviews with observational data) and member checking can help mitigate but not eliminate this risk [6,12]. Finally, MMR raises unique ethical considerations. Researchers must ensure that informed consent is obtained for both the qualitative and quantitative components of the study, while also safeguarding participant confidentiality [8,46]. Balancing the ethical implications of using multiple data sources can complicate the research process and necessitate additional ethical oversight.

7. Conclusions and Prospects

Mixed-methods research is a critical approach for comprehensively understanding complex social phenomena in healthcare. By integrating qualitative and quantitative methodologies, it enables researchers to address multifaceted questions that cannot be fully explored through a single method. This approach combines numerical data with contextual insights, offering a holistic perspective on issues such as patient satisfaction, healthcare disparities, and intervention effectiveness. Despite challenges such as data integration complexity, resource demands, and the need for dual methodological expertise, mixed-methods research provides unique insights into both statistical trends and their underlying drivers. However, broader adoption of MMR faces additional systemic barriers, including the persistent hierarchy of evidence that privileges quantitative research. Qualitative methods, though vital for capturing lived experiences and contextual nuances, are often undervalued in funding decisions, publication criteria, and institutional reward systems. This bias stems from a historical emphasis on generalizability and statistical power, which can marginalize research prioritizing depth, meaning, or participatory approaches. Consequently, researchers may perceive MMR as riskier or less prestigious despite its ability to generate richer, more actionable findings. As healthcare systems grow increasingly complex, this approach will remain essential for informing evidence-based decision-making, policy development, and the design of personalized interventions. To fully acknowledge MMR's potential, the research community must advocate equitable evaluation criteria, interdisciplinary training, and funding structures that recognize the synergy of qualitative and quantitative rigor. The future of MMR is promising as it bridges knowledge gaps and advances the understanding of diverse healthcare challenges.

Author Contributions: All authors were involved in the conceptualization, design of the study, literature search, and synthesis of the findings. K.R. drafted the manuscript. R.C. critically revised the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding. Open access article processing and in-kind logistical support were provided by Philanthropy Research Collaboration.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgments: This research was conducted as part of the Scholarship, Partnerships and Research for Knowledge (SPARK) initiative under the Philanthropy Research Collaboration. We would like to acknowledge all the members of Philanthropy Research Collaboration (previously known as Philanthropy Nepal Research Collaboration) for their support and assistance in completing the project.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Creswell, J.W.; Plano Clark, V.L. *Designing and Conducting Mixed Methods Research*, 3rd ed.; SAGE: Los Angeles, CA, USA, 2018.
2. Collins, K.M.T.; Onwuegbuzie, A.J.; Jiao, Q.G. A Mixed Methods Investigation of Mixed Methods Sampling Designs in Social and Health Science Research. *J. Mix. Methods Res.* **2007**, *1*, 267–294. [CrossRef]
3. Tashakkori, A.; Teddlie, C. *Mixed Methodology: Combining Qualitative and Quantitative Approaches*; Sage: Thousand Oaks, CA, USA, 1998.
4. Johnson, R.B.; Onwuegbuzie, A.J. Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educ. Res.* **2004**, *33*, 14–26. [CrossRef]
5. Gibson, C.B. Elaboration, Generalization, Triangulation, and Interpretation: On Enhancing the Value of Mixed Method Research. *Organ. Res. Methods* **2016**, *20*, 193–223. [CrossRef]
6. Rana, K.; Poudel, P.; Chimoriya, R. Qualitative Methodology in Translational Health Research: Current Practices and Future Directions. *Healthcare* **2023**, *11*, 2665. [CrossRef]
7. Curry, L.A.; Nembhard, I.M.; Bradley, E.H. Qualitative and Mixed Methods Provide Unique Contributions to Outcomes Research. *Circulation* **2009**, *119*, 1442–1452. [CrossRef]
8. Fetters, M.D.; Curry, L.A.; Creswell, J.W. Achieving Integration in Mixed Methods Designs—Principles and Practices. *Health Serv. Res.* **2013**, *48*, 2134–2156. [CrossRef]
9. Rana, K.; Page, A.; Kent, J.L.; Arora, A. Pathways Linking Housing Inequalities and Health Outcomes among Migrant and Refugee Populations in High-Income Countries: A Protocol for a Mixed-Methods Systematic Review. *Int. J. Environ. Res. Public Health* **2022**, *19*, 16627. [CrossRef]
10. Guetterman, T.C.; Fetters, M.D.; Creswell, J.W. Integrating Quantitative and Qualitative Results in Health Science Mixed Methods Research Through Joint Displays. *Ann. Fam. Med.* **2015**, *13*, 554–561. [CrossRef]
11. Rana, K.; Kent, J.L.; Page, A. Housing inequalities and health outcomes among migrant and refugee populations in high-income countries: A mixed-methods systematic review. *BMC Public Health* **2025**, *25*, 1098. [CrossRef]
12. Arias Valencia, M.M. Principles, Scope, and Limitations of the Methodological Triangulation. *Investig. Y Educ. Enfermería* **2022**, *40*, e03.
13. Denzin, N.K. *The Research Act: A Theoretical Introduction to Sociological Methods*, 1st ed.; Taylor and Francis: London, UK, 2017.
14. Campbell, D.T.; Fiske, D.W. Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychol. Bull.* **1959**, *56*, 81–105. [CrossRef]
15. Greene, J.C.; Caracelli, V.J.; Graham, W.F. Toward a Conceptual Framework for Mixed-Method Evaluation Designs. *Educ. Eval. Policy Anal.* **1989**, *11*, 255–274. [CrossRef]
16. Arora, A.; Maharaj, R.; Naidu, S.; Chimoriya, R.; Bhole, S.; Nash, S.; Jones, C. Views of Indian Migrants on Adaptation of Child Oral Health Leaflets: A Qualitative Study. *Children* **2021**, *8*, 28. [CrossRef]
17. Wesely, P.M. Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences. *Mod. Lang. J.* **2011**, *95*, 152–153. [CrossRef]
18. Morse, J.M. Approaches to Qualitative-Quantitative Methodological Triangulation. *Nurs. Res.* **1991**, *40*, 120–123.
19. Wasti, S.P.; Simkhada, P.; van Teijlingen, E.R.; Sathian, B.; Banerjee, I. The Growing Importance of Mixed-Methods Research in Health. *Nepal J. Epidemiol.* **2022**, *12*, 1175–1178. [CrossRef]
20. Teddlie, C.; Tashakkori, A. *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*; Sage Publications: Thousand Oaks, CA, USA, 2009.
21. Ivankova, N.V.; Creswell, J.W.; Stick, S.L. Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. *Field Methods* **2006**, *18*, 3–20. [CrossRef]
22. Tashakkori, A.; Teddlie, C. *Sage Handbook of Mixed Methods in Social & Behavioral Research*, 2nd ed.; SAGE Publications: Los Angeles, CA, USA, 2010.

23. Bryman, A. Integrating quantitative and qualitative research: How is it done? *Qual. Res.* **2006**, *6*, 97–113. [CrossRef]
24. Onwuegbuzie, A.J.; Slate, J.R.; Leech, N.L.; Collins, K.M. Mixed data analysis: Advanced integration techniques. *Int. J. Mult. Res. Approaches* **2009**, *3*, 13–33. [CrossRef]
25. Kwok, C.S.; Muntean, E.-A.; Mallen, C.D.; Borovac, J.A. Data Collection Theory in Healthcare Research: The Minimum Dataset in Quantitative Studies. *Clin. Pract.* **2022**, *12*, 832–844. [CrossRef] [PubMed]
26. Khoa, B.T.; Hung, B.P.; Hejsalem-Brahmi, M. Qualitative research in social sciences: Data collection, data analysis and report writing. *Int. J. Public Sect. Perform. Manag.* **2023**, *12*, 187–209. [CrossRef]
27. Kawar Lina, N.; Dunbar Ghada, B.; Aquino-Maneja Emma, M.; Flores Sarah, L.; Squier Victoria, R.; Failla Kim, R. Quantitative, Qualitative, Mixed Methods, and Triangulation Research Simplified. *J. Contin. Educ. Nurs.* **2024**, *55*, 338–344. [CrossRef]
28. Dickson, V.V.; Page, S.D. Using mixed methods in cardiovascular nursing research: Answering the why, the how, and the what's next. *Eur. J. Cardiovasc. Nurs.* **2021**, *20*, 82–89. [CrossRef] [PubMed]
29. Lim, W.M. What Is Qualitative Research? An Overview and Guidelines. *Australas. Mark. J.* **2024**, 14413582241264619. [CrossRef]
30. de Cruz, N.; Ong, N. *Data Visualisation of Quantitative Findings: Infusing Statistics with Emotion*, 1st ed.; Routledge: Oxfordshire, UK, 2022; pp. 123–148.
31. Hitchcock, J.H.; Onwuegbuzie, A.J. Application of mixed methods for international and cross-cultural research. In *Handbook of School Psychology in the Global Context: Transnational Approaches to Support Children, Families and School Communities*; Springer: Berlin/Heidelberg, Germany, 2024; pp. 339–357.
32. Younas, A.; Fàbregues, S.; Creswell, J.W. Generating metainferences in mixed methods research: A worked example in convergent mixed methods designs. *Methodol. Innov.* **2023**, *16*, 276–291. [CrossRef]
33. Younas, A.; Fàbregues, S.; Munce, S.; Creswell, J.W. Framework for types of metainferences in mixed methods research. *BMC Med. Res. Methodol.* **2025**, *25*, 18. [CrossRef]
34. O'Cathain, A.; Murphy, E.; Nicholl, J. Three techniques for integrating data in mixed methods studies. *BMJ* **2010**, *341*, c4587. [CrossRef] [PubMed]
35. Shorten, A.; Smith, J. Mixed methods research: Expanding the evidence base. *Evid. Based Nurs.* **2017**, *20*, 74. [CrossRef]
36. McKim, C.A. The Value of Mixed Methods Research: A Mixed Methods Study. *J. Mix. Methods Res.* **2015**, *11*, 202–222. [CrossRef]
37. Östlund, U.; Kidd, L.; Wengström, Y.; Rowa-Dewar, N. Combining qualitative and quantitative research within mixed method research designs: A methodological review. *Int. J. Nurs. Stud.* **2011**, *48*, 369–383. [CrossRef]
38. Palinkas, L.A.; Aarons, G.A.; Horwitz, S.; Chamberlain, P.; Hurlburt, M.; Landsverk, J. Mixed Method Designs in Implementation Research. *Adm. Policy Ment. Health Ment. Health Serv. Res.* **2011**, *38*, 44–53. [CrossRef]
39. Arora, A.; Rana, K.; Manohar, N.; Li, L.; Bhole, S.; Chimoriya, R. Perceptions and Practices of Oral Health Care Professionals in Preventing and Managing Childhood Obesity. *Nutrients* **2022**, *14*, 1809. [CrossRef] [PubMed]
40. Chimoriya, R.; MacMillan, F.; Lean, M.; Simmons, D.; Piya, M.K. A qualitative study of the perceptions and experiences of participants and healthcare professionals in the DiRECT-Australia type 2 diabetes remission service. *Diabet. Med.* **2024**, *41*, e15301. [CrossRef]
41. Palinkas, L.A.; Horwitz, S.M.; Green, C.A.; Wisdom, J.P.; Duan, N.; Hoagwood, K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Adm. Policy Ment. Health Ment. Health Serv. Res.* **2015**, *42*, 533–544. [CrossRef]
42. Halcomb, E.; Hickman, L. Mixed methods research. *Nurs. Stand.* **2015**, *29*, 41. [CrossRef] [PubMed]
43. Abowitz, D.A.; Toole, T.M. Mixed Method Research: Fundamental Issues of Design, Validity, and Reliability in Construction Research. *J. Constr. Eng. Manag.* **2010**, *136*, 108–116. [CrossRef]
44. Rana, K.; Aitken, S.J.; Chimoriya, R. Interdisciplinary Approaches in Doctoral and Higher Research Education: An Integrative Scoping Review. *Educ. Sci.* **2025**, *15*, 72. [CrossRef]
45. Bispo Júnior, J.P. Social desirability bias in qualitative health research. *Rev. Saude Publica* **2022**, *56*, 101. [CrossRef]
46. Stadnick, N.A.; Poth, C.N.; Guetterman, T.C.; Gallo, J.J. Advancing discussion of ethics in mixed methods health services research. *BMC Health Serv. Res.* **2021**, *21*, 577. [CrossRef]

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