



Integrating Qualitative Methods in Epidemiological Research: A Powerful Tool for Understanding Health Phenomena

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Abstract

Epidemiology, traditionally focused on quantifying disease patterns and identifying risk factors, has increasingly recognized the value of integrating qualitative methods to gain deeper insights into the social, cultural, and behavioral dimensions of health. This paper examines the integration of qualitative methods in epidemiological research, highlighting their strengths in exploring complex health phenomena, uncovering nuanced experiences, and generating rich contextual data. We discuss various qualitative methods, including interviews, focus groups, observation, and document analysis, and their applications in epidemiological research. The paper explores the complementary nature of qualitative and quantitative methods, emphasizing how they can be combined to provide a more comprehensive understanding of health issues. We further address challenges associated with integrating qualitative methods, including data analysis, interpretation, and ensuring rigor and trustworthiness. Finally, we present examples of how qualitative methods have enriched epidemiological research, revealing the richness of human experiences and contributing to more effective public health interventions.

Keywords: Qualitative methods, epidemiology, mixed methods, interviews, focus groups, observation, document analysis, data analysis, interpretation, rigor, trustworthiness, public health interventions

1 Introduction

Epidemiology, a cornerstone of public health, has historically been dominated by quantitative methodologies, relying on statistical analysis, population-based surveys, and large-scale datasets to investigate the distribution and determinants of health and disease within populations. These quantitative methods, while offering invaluable insights into disease prevalence, incidence, and risk factors, often fall short in capturing the intricate social, cultural, and behavioral contexts that profoundly influence health outcomes. The limitations of a purely quantitative approach have led to a growing recognition of the critical need to integrate qualitative methods into epidemiological research, thereby enriching the field with a more nuanced understanding of human experiences, beliefs, and practices related to health. Qualitative methods, with their emphasis on in-depth exploration, contextual understanding, and participant perspectives, provide a vital complement to quantitative approaches, allowing researchers to delve into the “why” behind the “what” and uncover the complex social dynamics that shape health patterns and disparities.

This paper aims to explore the increasingly important integration of qualitative methods into epidemiological research, providing a critical assessment of their strengths, diverse applications, inherent challenges, and the transformative potential they offer in enhancing our understanding of health phenomena. We will examine the diverse range of qualitative methodologies that can be utilized

in epidemiological studies, including in-depth interviews, focus group discussions, ethnographic observations, and participatory action research. This exploration will delve into the unique contributions of qualitative research in providing a contextual understanding of health behaviors, revealing local knowledge and beliefs, and highlighting the experiences of marginalized and vulnerable populations. We will also address the practical and methodological challenges associated with integrating qualitative and quantitative approaches, including issues related to data analysis, rigor, and the potential for bias. Furthermore, we will consider the ethical considerations involved in conducting qualitative research, particularly in sensitive settings and with vulnerable participants. This paper seeks to provide a comprehensive overview of the current state of knowledge, identify critical gaps in understanding, and ultimately contribute to the more effective application of mixed-methods approaches that integrate qualitative and quantitative methods to advance epidemiological research and public health practice. The assessment will acknowledge the diversity of perspectives and the need for interdisciplinary collaborations to fully realize the potential of qualitative research to enhance the understanding of complex health issues.

2 The Power of Qualitative Methods in Epidemiology

Qualitative research methods offer a unique and powerful lens through which to examine complex health phenomena,

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providing a vital complement to traditional quantitative epidemiological approaches. These methods, with their emphasis on in-depth exploration, contextual understanding, and the lived experiences of participants, allow researchers to move beyond simple statistical correlations and delve into the intricate social, cultural, and behavioral factors that shape health outcomes. This section explores the specific strengths of qualitative methods in epidemiological research, highlighting their ability to reveal nuances, generate rich data, and provide a more holistic and human-centered understanding of health and disease (1).

Qualitative methods excel at exploring complex health phenomena by providing a nuanced understanding of how health issues are experienced and understood by individuals, communities, and cultures. Unlike quantitative approaches that focus on measuring the magnitude of health problems, qualitative methods delve into the meanings, interpretations, and lived experiences associated with those problems. This approach allows researchers to understand the diverse ways in which people perceive their health, the factors that influence their health behaviors, and the social, cultural, and environmental barriers they face in achieving optimal health. Qualitative research is particularly valuable in uncovering the social determinants of health, the often-invisible structures and forces that shape health outcomes. Through in-depth interviews and ethnographic observations, qualitative researchers can explore the role of poverty, discrimination, access to resources, and social support networks in shaping health disparities (2). Furthermore, qualitative research is invaluable for understanding health behaviors that are shaped by deeply rooted cultural beliefs, attitudes, and practices. By engaging with participants in their natural settings and through open-ended dialogues, researchers can gain insights into the underlying motivations that drive health-related choices and develop interventions that are more culturally sensitive and contextually appropriate. Qualitative methods also play a crucial role in understanding the complex interplay of biological, psychological, and social factors that contribute to the experience of chronic conditions. By exploring the lived experiences of individuals with chronic illnesses, qualitative researchers can identify unmet needs, inform the development of patient-centered care models, and advocate for policies that improve the quality of life for individuals living with chronic conditions. In essence, qualitative research brings the human dimension to epidemiological studies, providing a rich tapestry of information that transcends simple statistical correlations and allows for a deeper understanding of the complex social determinants of health and disease (3).

Qualitative methods are particularly adept at generating rich and detailed data, capturing the complex nuances of human experiences and perspectives. Unlike quantitative approaches that often rely on standardized questionnaires and numerical data, qualitative research uses open-ended questions, in-depth interviews, focus group discussions, and ethnographic observations to gather detailed narratives, stories, and descriptions of lived experiences. This approach provides opportunities for researchers to delve deeper into themes, ask follow-up questions, and uncover unexpected insights that might not have been revealed through quantitative methods. The open-ended nature of qualitative methods allows participants to express their experiences in their own words, providing a more authentic and accurate representation of their perspectives. Furthermore, qualitative research prioritizes the voices of participants, ensuring that their experiences, perspectives, and concerns are captured and valued (4). This participatory approach empowers marginalized and vulnerable populations to share their stories, challenge existing

assumptions, and contribute to the generation of knowledge that is relevant and meaningful to their lived experiences. Qualitative data, presented as rich narratives and detailed descriptions, can complement quantitative data by providing a deeper understanding of the context and mechanisms underlying statistical associations. For example, qualitative research can be used to explore why specific interventions have been effective in one context but not in another, or to uncover the barriers and facilitators to health behaviors among specific populations. In summary, the rich data generated through qualitative methods provides valuable insights into the human dimensions of health and disease, allowing for a more holistic and nuanced understanding of the complex factors that influence health outcomes (5).

3 Qualitative Methods in Epidemiology: Examples and Applications

The integration of qualitative methods into epidemiological research involves the strategic use of a diverse range of techniques, each offering unique strengths for exploring specific research questions. This section provides a detailed overview of several commonly used qualitative methods in epidemiology, including interviews, observation, and document analysis, highlighting their distinct characteristics, applications, and contributions to the field. By understanding the nuances of each method, researchers can select the most appropriate approaches for addressing specific research objectives and gaining a more comprehensive understanding of complex health phenomena (6).

Interviews, a cornerstone of qualitative research, offer a versatile approach to gathering in-depth information about individual and collective perspectives on health-related issues. Within the realm of epidemiology, interviews are frequently employed to understand the lived experiences of individuals affected by specific diseases, explore health beliefs and practices, and examine the social context that shapes health behaviors. Two commonly used types of interviews in epidemiological research are semi-structured interviews and focus group discussions (7).

Semi-structured Interviews: These interviews involve in-depth conversations with individual participants, guided by a flexible interview guide that allows for open-ended questions and follow-up probes. Semi-structured interviews provide an opportunity to explore participants' experiences, perspectives, and beliefs on health-related issues in a detailed and nuanced manner. Researchers can adapt their questioning based on participants' responses, allowing them to delve into emerging themes and uncover unexpected insights. Semi-structured interviews are particularly useful for exploring sensitive topics, capturing diverse perspectives, and understanding the unique challenges faced by different populations. For example, semi-structured interviews could be used to explore the experiences of individuals living with chronic pain, the impact of stigma on individuals with mental health conditions, or the cultural beliefs that influence the use of traditional medicine. The data collected through semi-structured interviews is typically in the form of rich narrative descriptions that capture the complexities of human experience (8).

Focus Groups: Focus groups involve facilitated discussions among small groups of individuals who share a common experience or characteristic relevant to the research question. These group discussions are designed to explore common themes, generate insights into shared experiences, and examine the social dynamics that shape health beliefs and behaviors. Focus groups are particularly useful for understanding community-level norms, exploring the influence of social

networks on health practices, and gaining insights into the collective perceptions of health issues. For example, focus groups could be used to explore community attitudes toward vaccination, the social norms that influence diet and physical activity behaviors, or the community-level responses to a public health crisis. Focus group discussions generate data in the form of dialogues and interactions, providing a rich understanding of how individuals' beliefs and experiences are shaped by their social context (9).

Observation methods provide a valuable means of gaining contextual understanding by directly observing behaviors and interactions in natural settings. These methods allow researchers to examine how health practices are enacted in real-world situations and how the physical environment and social context shape health behaviors. Two commonly used types of observation in epidemiological research are participant observation and non-participant observation (10).

Participant Observation: In participant observation, researchers immerse themselves in the context of interest, becoming active participants in the daily lives of the individuals or communities being studied. This immersive approach allows researchers to gain a deeper understanding of health-related practices, social interactions, and the cultural norms that influence health behaviors. Researchers can observe first-hand how people use healthcare services, how they interact with their environment, and how they navigate daily life in ways that may impact their health. Participant observation is particularly useful for understanding the unspoken rules, the hidden power dynamics, and the tacit knowledge that may not be revealed through interviews or focus group discussions. For example, a researcher conducting a study on the impact of poverty on health could participate in the daily lives of individuals living in poverty, observing how their access to resources, their social interactions, and their living environments influence their health. The data generated through participant observation is typically in the form of detailed field notes, rich descriptions of observations, and reflections on the researcher's experiences (11).

Non-participant Observation: In non-participant observation, researchers observe a setting or group of individuals from a detached perspective, without actively participating in their activities. This approach allows researchers to document behaviors and interactions in a more systematic and structured manner. Non-participant observation is particularly useful for examining specific types of behavior, documenting the use of healthcare facilities, or assessing the impact of environmental conditions on health. For example, a researcher conducting a study on the impact of physical environment on childhood obesity could observe children in school or community settings, documenting their levels of physical activity, their interactions with food environments, and their access to healthy foods. Non-participant observation data is typically collected through detailed checklists, field notes, or video recordings, providing a structured record of the observed behaviors and settings (12).

Qualitative Methods in Epidemiology	Integrating Qualitative and Quantitative Methods
<ul style="list-style-type: none"> • Interviews • Observation • Document Analysis 	<ul style="list-style-type: none"> • Complementary Strengths • Triangulation • Addressing Limitations

Figure 1: Integrating Qualitative Methods in Epidemiological Research

Document analysis is a qualitative method that involves the systematic review and interpretation of written materials, such as medical records, policy documents, media articles, or historical archives. This approach provides valuable insights into health-related issues by examining how health problems are defined, how policies are shaped, and how health is represented in different contexts. Textual analysis, a specific type of document analysis, focuses on the language used in written materials, exploring how specific terms are used, how arguments are constructed, and how power dynamics are reflected in written texts. For example, document analysis could be used to explore how health policies are framed in relation to specific diseases, how healthcare providers describe patient experiences in medical records, or how health issues are portrayed in the media. Document analysis is particularly useful for exploring the historical context of health problems, examining the influence of political and economic forces on health policies, and identifying the dominant narratives surrounding health and disease. The data generated through document analysis typically consists of textual excerpts, interpretations of meaning, and analysis of underlying themes.

4 Integrating Qualitative and Quantitative Methods: A Mixed Methods Approach

The integration of qualitative and quantitative methods, known as a mixed methods approach, offers a powerful strategy for addressing complex epidemiological research questions. By strategically combining the strengths of both approaches, researchers can gain a more comprehensive, nuanced, and robust understanding of health phenomena. This section explores the significant advantages of a mixed methods approach in epidemiological research, highlighting how qualitative methods can complement and enrich quantitative data, facilitate triangulation, and address the limitations inherent in using either approach in isolation (1).

One of the primary advantages of a mixed methods approach is the ability to leverage the complementary strengths of qualitative and quantitative methods. Quantitative methods, with their focus on statistical analysis, large-scale surveys, and numerical data, provide valuable insights into the prevalence, incidence, and distribution of health issues, as well as the identification of statistical associations between risk factors and outcomes. However, quantitative methods often lack the depth and nuance necessary to understand the complex social, cultural, and behavioral factors that shape these associations. Qualitative methods, on the other hand, excel at exploring the lived experiences of individuals, uncovering underlying beliefs and motivations, and providing a contextual understanding of health phenomena. By combining qualitative and quantitative data, researchers can gain a more comprehensive understanding of both the magnitude and the meaning of health problems. For example, a study investigating the effectiveness of a health intervention may use quantitative data to measure changes in health outcomes while using qualitative data to explore how the intervention was experienced by participants, what factors influenced their participation, and what contextual factors contributed to its success or failure. The insights gained from the qualitative data can then be used to interpret the quantitative findings and develop more effective and tailored interventions. Similarly, qualitative data can be used to inform the design of quantitative surveys, ensuring that the questions are culturally sensitive, contextually relevant, and capture the full spectrum of experiences related to the research topic (1).

Another key advantage of a mixed methods approach is the potential for triangulation, which involves using multiple

sources of data and multiple methods to explore the same research question. Triangulation helps to increase the rigor and validity of research findings by providing a more comprehensive and robust understanding of a phenomenon. When findings from different methods converge, researchers can have greater confidence in the validity of their conclusions. For example, if quantitative survey data indicates that a certain population has a higher prevalence of a specific disease, and qualitative interviews with individuals in that population reveal shared experiences and risk factors, the findings from both methods triangulate to strengthen the overall validity of the research. Furthermore, triangulation can help to address potential biases inherent in a single method approach. If, for example, a quantitative survey is influenced by recall bias, qualitative data gathered through in-depth interviews can provide a more accurate representation of past experiences. Triangulation can also identify inconsistencies or contradictions in the data, which can then be explored further to uncover unexpected insights or reveal complexities that were not initially anticipated. By combining different types of data, researchers can gain a more holistic understanding of the research topic, ensuring that their conclusions are supported by multiple lines of evidence (13).

Finally, a mixed methods approach can be particularly valuable in addressing the limitations inherent in using either quantitative or qualitative methods in isolation. Qualitative methods can address the limitations of quantitative research, such as its inability to explore complex social dynamics, cultural influences, and individual perspectives. Quantitative methods, on the other hand, can address the limitations of qualitative research, such as the challenge of generalizing findings from a small sample to a broader population. By combining both approaches, researchers can mitigate the weaknesses of each and maximize the strengths of both. For example, while quantitative methods may fail to capture the full range of experiences related to chronic pain, qualitative interviews can provide a more detailed and nuanced account of the lived experiences of individuals with this condition. Conversely, while qualitative research may provide rich insights into the local context of a health issue, quantitative data can be used to assess the prevalence and distribution of the problem in a broader population. Furthermore, a mixed methods approach can be particularly useful in addressing health inequities, ensuring that research is responsive to the needs of diverse populations and promotes more equitable health outcomes. By combining quantitative data that reveals disparities with qualitative data that explains their underlying causes, researchers can develop more targeted and effective interventions that address the complex social determinants of health.

5 Challenges in Integrating Qualitative Methods

While the integration of qualitative methods into epidemiological research offers significant benefits, it also presents several methodological and practical challenges that must be carefully addressed to ensure the validity, reliability, and trustworthiness of research findings. This section explores the key challenges associated with integrating qualitative methods, focusing on the complexities of data analysis and interpretation, the need to ensure rigor and trustworthiness, and the practical considerations that can affect the successful implementation of qualitative research within the epidemiological paradigm. Overcoming these challenges requires a commitment to rigorous methodological practices, a nuanced understanding of qualitative research principles, and a

collaborative approach that draws on the expertise of both qualitative and quantitative researchers (2).

One of the most significant challenges in integrating qualitative methods into epidemiological research lies in the analysis and interpretation of qualitative data. Unlike quantitative data, which is typically analyzed using statistical techniques, qualitative data, which often consists of text, audio recordings, or field notes, requires interpretive approaches to identify patterns, themes, and meanings. The sheer volume of qualitative data can make analysis challenging, and the process can be time-consuming and labor-intensive. Rigorous qualitative analysis requires a systematic approach that involves coding, thematic analysis, and a careful interpretation of the meaning of the data in relation to the research question. Researchers must be adept at identifying recurring themes, patterns, and relationships in the data, and must also be aware of their own biases and pre-conceived notions that may influence their interpretations. The subjective nature of qualitative analysis raises questions about objectivity and the potential for researcher bias (14). Researchers must be transparent about their analytic methods, document their coding procedures, and provide clear justifications for their interpretations. Furthermore, it is crucial to consider the context in which data was collected, as qualitative data is often context-specific and the meanings derived from it can be influenced by the social, cultural, and historical background of the participants. The lack of standardized approaches to qualitative data analysis can also be challenging, as there are many different theoretical frameworks and analytic techniques available. Researchers must select appropriate analytic approaches that align with the research question, and must provide clear justifications for their methodological choices. Furthermore, the interpretation of qualitative data requires careful consideration of the diverse perspectives and experiences of participants, recognizing that there are often multiple valid interpretations of the same data (15).

Ensuring the rigor and trustworthiness of qualitative research findings is essential for establishing their credibility and relevance within the broader scientific community. Unlike quantitative research, which relies on statistical tests to assess validity and reliability, qualitative research relies on different criteria for establishing trustworthiness. Key criteria include credibility, transferability, dependability, and confirmability. Credibility: Credibility, analogous to internal validity in quantitative research, refers to the believability of the research findings and the extent to which they accurately reflect the experiences and perspectives of the participants. Establishing credibility requires careful attention to data collection methods, the triangulation of data sources, and the use of member checks, in which researchers share their interpretations with participants to ensure that they are accurate and meaningful. Researchers must also be transparent about their research biases and document the procedures used to minimize their influence on the data (16).

Transferability: Transferability, analogous to external validity in quantitative research, refers to the extent to which research findings can be generalized or transferred to other contexts and populations. Unlike quantitative research, which often seeks to establish generalizable findings, qualitative research is typically context-specific, and the extent to which findings can be transferred to other settings must be carefully assessed. Researchers must provide a rich description of the study context, the characteristics of the participants, and the specific methods used, so that readers can assess the potential relevance of the findings to other contexts. Furthermore, it is essential to acknowledge the limitations of the study and to

identify the factors that may affect the transferability of the findings (17).

Dependability: Dependability, analogous to reliability in quantitative research, refers to the consistency and stability of research findings over time. Establishing dependability requires meticulous documentation of the research process, including the data collection methods, the coding procedures, and the analytic techniques. Researchers must also maintain an audit trail of their decisions, providing a clear record of how they arrived at their conclusions. Furthermore, peer review and collaborative data analysis can help to ensure the consistency and stability of research findings (18).

Confirmability: Confirmability, analogous to objectivity in quantitative research, refers to the extent to which the research findings are grounded in the data and not influenced by researcher biases. Establishing confirmability requires researchers to be transparent about their assumptions, to justify their interpretations, and to provide evidence from the data to support their claims. Furthermore, researchers must acknowledge the potential for multiple interpretations of the data, and must present a balanced and nuanced perspective. Peer debriefing and the use of reflexive journaling can help to ensure that findings are credible and grounded in the data (19).

In addition to the methodological challenges, the integration of qualitative methods into epidemiological research also presents several practical considerations. Qualitative research can be time-consuming and labor-intensive, often requiring extensive data collection periods, in-depth interviews, and careful data analysis. Furthermore, conducting high-quality qualitative research requires specific skillsets, including expertise in interview techniques, ethnographic observation, data analysis, and qualitative research principles. These skills may not always be available within traditional epidemiological research teams, requiring collaborations with qualitative researchers from other disciplines. Furthermore, the integration of qualitative methods may require additional resources, including funds for data collection, transcription, and data analysis software. Addressing these practical considerations requires careful planning, budgeting, and the establishment of interdisciplinary research teams.

6 Conclusion

The integration of qualitative methods into epidemiological research represents a paradigm shift, offering a powerful and transformative approach to understanding the complex social, cultural, and behavioral factors that profoundly influence health and disease. This exploration of the complementary strengths of qualitative and quantitative methodologies has underscored the limitations of relying solely on quantitative approaches and highlighted the crucial role of qualitative research in providing a deeper, more nuanced understanding of health phenomena. By embracing a mixed methods approach, epidemiologists can move beyond the narrow confines of statistical correlations and delve into the rich tapestry of human experiences, beliefs, and contexts that shape health outcomes. This conclusion synthesizes the key insights from this examination, emphasizing the imperative of integrating qualitative methods to achieve a more comprehensive, equitable, and impactful approach to epidemiological research and public health practice. The future of epidemiology lies in the synergistic combination of qualitative and quantitative methods to unravel the complex web of factors that influence health and well-being across diverse populations. The preceding sections have demonstrated that while quantitative methods provide valuable insights into the magnitude and distribution of health issues, qualitative methods offer the

unique ability to explore the meanings, interpretations, and lived experiences associated with those issues. Qualitative methods allow researchers to uncover the hidden social dynamics, cultural norms, and individual perspectives that shape health behaviors, influence access to healthcare, and contribute to health disparities. By delving into the “why” behind the “what,” qualitative research provides a critical context for interpreting quantitative findings and developing interventions that are more effective, culturally appropriate, and ethically sound. Furthermore, the use of qualitative methods can empower marginalized and vulnerable populations to voice their experiences, challenge existing assumptions, and contribute to the development of knowledge that is relevant to their specific needs.

Ethical issue

Authors are aware of and comply with, best practices in publication ethics specifically about authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests, and compliance with policies on research ethics. Authors adhere to publication requirements that the submitted work is original and has not been published elsewhere in any language.

Competing interests

The authors declare that no conflict of interest would prejudice the impartiality of this scientific work.

Author Contributions

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