JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(2), 978-991
ISSN: 2589-1316

Diagnosis of Data Saturation and Holistic Interpretation: A Multi-Layered Approach to Planning Qualitative Sample Size

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Citation: Kruasom, T., Kantatasiri, P. and Harasarn, A. (2025). Diagnosis of Data Saturation and Holistic Interpretation: A Multi-Layered Approach to Planning Qualitative Sample Size, *Journal of Cultural Analysis and Social Change*, 10(2), 978-991. https://doi.org/10.64753/jcasc.v10i2.1723

Published: November 13, 2025

ABSTRACT

Sample-size guidance in qualitative research has long centered on the idea of data saturation—the point at which further collection yields no substantively new insights (Glaser & Strauss, 1967). Yet, as the notion has migrated from its grounded-theory roots into routine practice, it is often applied as a blunt numerical target that overlooks data richness, participant diversity and theoretical coherence. This article traces the evolution of saturation, critically reviewing empirical studies and simulation models that try to forecast when it occurs. We identify the main forces shaping saturation—study scope, population heterogeneity and interview depth—and show why treating it as the sole indicator of adequacy can be misleading. To overcome these shortcomings, we introduce a multi-layered framework that fuses saturation diagnosis with checks on data richness, diversity of perspectives and theoretical fit. Practical tools such as iterative coding cycles, memo writing and saturation grids illustrate how the framework enhances analytic transparency and rigor. Reframing the question from "How many participants are enough?" to "How much understanding is sufficient?" offers researchers a structured yet flexible path to defensible sample planning.

Keywords: Qualitative Research; Data Saturation; Sample-Size Planning; Data Richness; Theoretical Adequacy, Diversity Of Perspectives; Saturation Diagnosis; Thematic Analysis, Grounded Theory

INTRODUCTION

Qualitative inquiry is shaped by multiple philosophical traditions rather than a single "one size fits all" method. Whether adopting a constructivist, interpretivist, or critical realist stance, researchers—novice and experienced alike—share a recurring dilemma: how to decide, and justify, when enough data have been collected. Unlike quantitative designs that rely on statistical power formulas, qualitative studies seek depth, richness, and contextual nuance—criteria that cannot be satisfied by a simple head count of participants (Pope et al., 2000).

Since Glaser and Strauss introduced theoretical saturation in The Discovery of Grounded Theory (1967), the term has morphed into the more generic data saturation used across thematic analysis, narrative inquiry, interpretative phenomenological analysis, and other approaches. Originally, saturation marked the moment when constant comparison yielded no new properties of a category—a marker of theoretical completeness rather than a predetermined sample size. As the concept migrated, however, it was increasingly treated as a numeric benchmark, detached from its analytic roots (Low, 2019).

Empirical work illustrates both the appeal and the pitfalls of this translation. Guest, Bunce, and Johnson (2006, as cited in Mason, 2010) reported that most novel information surfaces within the first five to six interviews, with 70% of themes appearing by the sixth interview and 92% by the twelfth—findings echoed by subsequent studies

(Gill, 2020). Yet patterns are far from uniform: Hagaman and Wutich (2017, as cited in Vasileiou et al., 2018) demonstrated that while sixteen interviews may suffice within a single cultural setting, cross-cultural research can require 20–40 to achieve comparable coverage.

Attempts to quantify saturation have produced decision aids that borrow from statistical logic. Fugard and Potts (2015, as cited in Aguboshim, 2021) estimated that 29 interviews are needed to detect themes with 10% prevalence at 80% confidence, while Galvin (2015 as cited in Nassaji, 2015) suggested a more 99% probability of identifying themes shared by 55% of the population with just six participants. Such models provide useful heuristics but cannot capture the interpretive, iterative character of qualitative analysis (Mensah, 2025).

Consequently, debate has shifted from "How many participants are enough?" to deeper methodological questions: How should saturation be defined across diverse methodologies? How can researchers demonstrate transparently that further data add no meaningful insight? Scholars increasingly view saturation as an ongoing diagnostic process that unfolds alongside coding and memo writing rather than a fixed endpoint (Vasileiou et al., 2018).

To meet these challenges, we introduce a multi-layered framework that situates saturation within a broader evaluation of data adequacy. The approach treats saturation as one thread in a braided assessment that also considers conceptual richness, diversity of perspectives, and theoretical fit. Rigorous qualitative inquiry is thus less about reaching redundancy and more about gathering a dataset sufficiently textured to illuminate the complexity of the phenomenon (Raskind et al., 2018).

Sample size decisions become reasoned judgments, not mechanical calculations. By combining saturation diagnostics with holistic interpretation of data quality, investigators can craft designs that are both methodologically defensible and intellectually fruitful—shifting emphasis from numerical sufficiency to interpretive sufficiency (Onwuegbuzie & Leech, 2007).

Research Design and Development: Problem, Question, and Objective

Despite the widespread use of qualitative research across disciplines, significant gaps persist in how sample size is conceptualized and justified. One of the most notable challenges is the reliance on the concept of data saturation as a marker of adequacy, yet without a shared or rigorously operationalized definition. In many studies, "saturation" is invoked as a self-evident endpoint, often with limited transparency about the criteria used to judge its attainment (Morse, 2015). This opacity produces inconsistencies in reporting and hampers reviewers' ability to evaluate rigour—ironically undermining the flexibility and reflexivity that qualitative inquiry prizes (Thorne, 2020).

A second gap is the overemphasis on saturation as the sole determinant of sample adequacy. Achieving surface-level saturation may reveal dominant themes, yet leave marginal or less frequent perspectives unexplored. Data adequacy is therefore a multidimensional construct that must encompass complexity, heterogeneity, and layered meaning (Braun & Clarke, 2019).

Third, qualitative researchers lack robust, widely accepted guidelines for planning sample size. In the absence of statistical power calculations, investigators often lean on experience, intuition, or precedent (Mason, 2010). Empirical benchmarks—such as Guest, Bunce, and Johnson's (2006, as cited in Vasileiou et al., 2018) finding that 70–92% of themes emerge within 12 interviews, or Hagaman and Wutich (2017, as cited in Bowen, 2008) demonstration that cross-cultural work may require 20–40—provide useful heuristics. Emerging quantitative tools, such as Fugard and Potts (2015, as cited in Aguboshim, 2021) estimates of sample needs or Galvin's (2021, as cited in Mensah, 2025) probabilistic models, also contribute, yet remain context-specific and insufficiently integrated with interpretive practice.

Research problem. How can qualitative researchers plan and justify sample sizes in ways that are at once systematic and sensitive to the depth and richness of data?

Research questions

(i) How can data saturation be better diagnosed and operationalized across different qualitative methodologies?

(ii) What additional criteria—beyond redundancy—should inform sample planning to ensure meaningful and inclusive insights?

(iii) How can a holistic interpretive lens enhance our understanding of sample adequacy?

Objectives:

1. Critically examine the historical origins and evolving interpretations of saturation, identifying its strengths and limitations.

2. Synthesize empirical and theoretical developments—including quantitative and meta-analytic work—to refine the concept of data adequacy.

3. Propose a multi-layered framework that combines saturation diagnosis with broader interpretive criteria, yielding a flexible yet rigorous approach to sampling decisions.

Integrated Research Proposition (RP) Framework

This study proposes a multi-layered, phased approach to determining qualitative sample adequacy, combining the four key dimensions of saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy (RP1–RP4) with a structured three-phase progression (Early, Middle, End). This framework ensures that sample planning and justification are both methodologically rigorous and interpretively robust (Constantinou et al., 2017).

- RP1 (Saturation Diagnosis): Qualitative sample adequacy is attained when saturation is systematically evaluated and confirmed, demonstrating that further data collection fails to yield new themes, patterns, or insights relevant to the research question (Guest et al., 2020).
- RP2 (Data Richness): Data adequacy is strengthened when the dataset not only achieves saturation but also provides rich, detailed, and contextually grounded narratives that enable deep interpretive analysis (Bowen, 2008).
- RP3 (Diversity of Perspectives): A sample is sufficient when saturation captures a broad spectrum of participant perspectives, ensuring that both dominant and marginalized voices are represented and analytically integrated (Roy et al., 2015).
- RP4 (Theoretical Adequacy): Qualitative sample adequacy is achieved when the collected data provides sufficient depth and coherence to support, refine, or challenge the theoretical framework or conceptual constructs guiding the study (Low, 2019).

These four dimensions are applied dynamically across three phases of qualitative inquiry:

- RP-Early (Exploration and Initial Saturation): In this phase, exploratory sampling ensures broad coverage of perspectives, while early saturation checks guide the refinement of data collection instruments and initial codes (O'Reilly & Parker, 2013).
- RP-Middle (Refinement and Data Richness): Here, data richness becomes the focus, as categories and themes are refined and deepened through iterative analysis, while ensuring diversity of perspectives is adequately represented (Hennink et al., 2017).
- RP-End (Final Saturation and Theoretical Adequacy): The final phase confirms saturation and evaluates theoretical adequacy, ensuring the dataset is conceptually comprehensive and capable of fully addressing the research questions (Mensah, 2025).

This integrated framework transforms sample size determination into a diagnostic and iterative process, reframing the guiding inquiry from "how many participants are enough?" to "how much saturation, richness, diversity, and theoretical depth is sufficient to achieve a holistic understanding of the phenomenon?"

LITERATURE REVIEW

Schools of Thought in Qualitative Research

Qualitative research is rooted in a rich intellectual tradition shaped by diverse philosophical and epistemological perspectives. Rather than following a single unified approach, it draws from various schools of thought that guide how researchers interpret reality, construct knowledge, and engage with participants. At its core, qualitative inquiry seeks to understand the complexity of human experiences and social phenomena, often emphasizing meaning-making over measurement (Nassaji, 2015).

One of the most prominent paradigms is interpretivism, which posits that reality is socially constructed and best understood through the subjective perspectives of individuals. This tradition, influenced by scholars such as Weber and Berger and Luckmann, underscores the co-construction of knowledge between researchers and participants. Closely linked is constructivism, which emphasizes that meaning emerges from interaction, context, and interpretation rather than existing as an objective truth (LaDonna et al., 2021).

In addition to interpretivist perspectives, critical theory has played a significant role in shaping qualitative approaches. Drawing on the works of Habermas and Freire, critical qualitative research seeks not only to interpret social realities but also to challenge power structures and promote social transformation. This school of thought underpins methodologies such as critical ethnography, participatory action research, and feminist inquiry, all of which aim to amplify marginalized voices and address issues of inequality (Bowen, 2008).

Postmodern and post-structuralist perspectives further diversify qualitative research by questioning the existence of singular truths. Thinkers such as Foucault and Derrida argue that knowledge is fragmented and influenced by language, discourse, and power relations. These perspectives have inspired approaches such as

discourse analysis and narrative deconstruction, which examine how meaning is shaped by social and cultural contexts (Denny & Weckesser, 2022).

Another foundational influence is phenomenology, pioneered by Husserl and later expanded by Heidegger and Merleau-Ponty. Phenomenology focuses on uncovering the essence of lived experiences, exploring how individuals perceive and make sense of the world. This has led to methodologies like interpretative phenomenological analysis (IPA), which delve into the subjective experiences of participants in rich detail (Hossain et al., 2024).

Finally, pragmatism offers a flexible and practice-oriented foundation, emphasizing the practical consequences and utility of research. Associated with thinkers like Dewey and James, pragmatism allows researchers to draw on qualitative, quantitative, or mixed methods as needed to address specific research problems (Alam, 2020).

Together, these schools of thought provide a conceptual foundation for qualitative research, shaping how studies are designed, how data are interpreted, and how knowledge claims are justified. By recognizing these diverse traditions, researchers can adopt a more reflexive and coherent approach, aligning their methodology with the philosophical underpinnings that best suit their research questions (Raskind et al., 2018).

Theoretical and Methodological Foundations of Saturation

The concept of saturation is rooted in the epistemological and methodological traditions of qualitative research, particularly in grounded theory, where it was first introduced by Glaser and Strauss in The Discovery of Grounded Theory (1967). In its original formulation, theoretical saturation referred to the point during iterative data collection and analysis when no new categories, properties, or relationships emerge. This notion was tightly linked to the logic of theory generation, whereby categories are continuously refined until they are fully developed and integrated into an emergent theoretical framework. Grounded theory's cyclical process of coding, constant comparison, and memo writing thus positioned saturation not as a rigid numerical target but as an outcome of theoretical completeness (Morse, 2015).

As qualitative methodologies evolved beyond grounded theory, the concept of saturation adapted to diverse interpretive traditions. In thematic analysis, narrative research, and phenomenological studies, saturation is often understood in terms of data saturation—the moment when new data fail to produce novel codes or themes relevant to the research question (Lowe et al., 2018). This shift reflects a methodological expansion from building formal theory toward exploring lived experiences, subjective meanings, and social contexts. Yet, the transfer of saturation across these methodologies has raised critical questions. Can a concept root in grounded theory be universally applied to interpretive or descriptive approaches that do not seek to develop formal theories? Scholars have argued that saturation should be reframed as a flexible and context-specific guideline, rather than a one-size-fits-all criterion (O'Reilly & Parker, 2013).

Moreover, saturation is closely tied to the philosophical underpinnings of qualitative inquiry. Constructivist paradigms emphasize the co-construction of knowledge between researcher and participant, which suggests that data generation is never truly complete but rather situated and partial (Mpofu, 2020). From this perspective, saturation is not an objective endpoint but a pragmatic judgment made with the research goals, the richness of the data, and the depth of interpretation required. Interpretivist traditions also highlight that meaning making is inherently layered; what appears as saturation at a surface level might still conceal deeper patterns or less visible voices within the dataset (Thorne, 2020).

Methodologically, the process of achieving saturation is intertwined with the design of the study, including sampling strategies, the scope of the research question, and the analytical framework. Purposeful and theoretical sampling—where participants are selected to maximize variation or to fill conceptual gaps—can accelerate the path to saturation by ensuring that diverse perspectives are captured early in the data collection phase (Nelson, 2017). Conversely, studies with broad or complex research questions may require a larger and more heterogeneous sample to achieve thematic completeness. Additionally, the iterative nature of qualitative analysis means that saturation is not determined solely by the quantity of data collected but by the researcher's ability to engage in continuous coding, comparison, and refinement of emerging insights (Van Rijnsoever, 2017).

Recent methodological debates have called for greater transparency in how saturation is assessed and reported. Scholars advocate for documenting the point at which new data cease to produce meaningful variation and for providing evidence of saturation, such as saturation tables or coding frequency charts (Guest et al., 2020). At the same time, there is a growing recognition that saturation is only one dimension of data adequacy. For instance, data richness—defined as the level of detail, nuance, and contextual depth captured within the narratives—is equally critical (Malterud et al., 2016). A dataset might reach saturation in terms of repetitive themes but still lack the richness needed to fully address the research question (Constantinou et al., 2017).

The theoretical and methodological foundations of saturation therefore underscore a critical tension: while saturation remains a valuable heuristic, it cannot serve as the single indicator of sample adequacy. It must be complemented by broader considerations of conceptual depth, analytical rigor, and the diversity of perspectives

represented in the data (Braun & Clarke, 2019). Recognizing this, our study seeks to advance the conversation by integrating saturation with a holistic, multi-layered approach to sample planning—one that moves beyond the question of "how many participants are enough" to address the deeper issue of "how much understanding is sufficient."

Towards a Multi-Layered Approach: Integrating Saturation and Holistic Interpretation

While saturation remains a cornerstone of qualitative research design, its limitations as a standalone measure highlight the need for a broader evaluative framework. The assumption that the absence of new codes or themes necessarily signals data adequacy can be problematic, particularly in studies involving complex social phenomena, cultural diversity, or marginalized perspectives (Rahimi & Khatooni, 2024). In such contexts, achieving saturation might reflect the redundancy of dominant narratives rather than the attainment of comprehensive understanding. Consequently, researchers have begun advocating for approaches that integrate saturation with additional indicators of data quality, including conceptual depth, thematic variation, and interpretive richness (Jennings & Yeager, 2025).

A multi-layered approach acknowledges that data adequacy is not solely determined by whether themes repeat but also by how well the data illuminates the subtleties and complexities of the research question. This perspective shifts the focus from quantity to quality—emphasizing not how many participants are interviewed, but how effectively their narratives contribute to a layered and meaningful analysis. For example, a dataset may reach saturation at a superficial level, but a closer examination might reveal that certain subgroups or less prominent narratives remain underexplored (Daher, 2023). A holistic interpretation ensures that these nuances are captured, thereby enhancing the depth and transferability of findings (Christou, 2025).

This approach also aligns with the iterative nature of qualitative research, in which data collection and analysis are closely intertwined. Rather than treating saturation as a final milestone, the multi-layered perspective conceptualizes it as one checkpoint among several. Throughout the research process, analysts must assess not only whether themes are repeating but also whether the data are sufficiently rich, diverse, and theoretically saturated to address the research objectives (Squire et al., 2023). This ongoing evaluation requires reflexivity and transparency, as researchers continually interrogate the adequacy of their sampling strategies and the interpretive depth of their analyses (Alam, 2020).

Moreover, integrating holistic interpretation with saturation can help address the epistemological diversity of qualitative research. Different traditions—such as constructivism, critical theory, and phenomenology—offer varied understandings of what constitutes sufficient data (Yang et al., 2022). A multi-layered approach is inherently flexible, accommodating these different paradigms while offering a structured framework for decision-making. It encourages researchers to balance methodological rigor with the interpretive complexity that qualitative studies demand (Rowlands et al., 2016).

The framework proposed in this paper builds on these principles by positioning saturation as a necessary but insufficient condition for sample adequacy. It incorporates additional layers of evaluation, such as the diversity of perspectives represented, the depth of narrative detail, and the coherence of emerging interpretations (Buckley, 2022). By adopting this perspective, we move away from the reductive question of "how many participants are enough" and instead ask the more critical question: "What constitutes enough understanding to meaningfully address the research question?"

A Multi-Layered Framework for Qualitative Sample Planning

Building on the limitations of saturation as a singular measure, this study proposes a multi-layered framework for planning and evaluating qualitative sample sizes. This framework integrates four interrelated dimensions: saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy. Each layer provides a unique lens for assessing data adequacy, ensuring that sample size decisions are grounded not only in the repetition of themes but also in the depth, variation, and theoretical alignment of the data.

Saturation Diagnosis

Saturation diagnosis remains the foundational layer of this framework, reflecting the established practice of identifying the point at which no new codes, categories, or themes emerge during data collection. This layer involves an ongoing assessment of thematic repetition and redundancy, typically through iterative coding and memo-writing. While saturation cannot be reduced to a fixed number of interviews or observations, diagnostic tools—such as saturation grids, code tracking tables, or analytic memos—can be used to document when and how saturation is achieved (Guest et al., 2020). The emphasis here is not on a numerical threshold but on systematically demonstrating that the data have reached a point of conceptual completeness relative to the research question.

Data Richness

While saturation diagnosis focuses on thematic repetition, data richness addresses the quality and depth of the data. As Lowe et al. (2018) contend, a dataset may technically achieve saturation while still lacking the contextual nuance or narrative complexity needed for meaningful interpretation. Data richness is characterized by thick descriptions—layered accounts that capture not only what is happening but also how and why. This framework prompts researchers to critically assess whether the dataset provides sufficient detail and interpretive depth to support robust analysis.

Diversity of Perspectives

A dataset might achieve both saturation and richness yet remain incomplete if it fails to capture the breadth of participant perspectives relevant to the phenomenon under study. The diversity of perspectives layer emphasizes variation across demographic, cultural, and contextual factors to ensure inclusivity. This consideration is especially important in research addressing multi-faceted or sensitive issues. As Van Rijnsoever (2017) demonstrated through simulation studies, sample sufficiency depends not only on the frequency of themes but also on the heterogeneity of the population being studied. Purposeful and maximum variation sampling strategies thus become essential to guarantee that both dominant and marginalized narratives are represented.

Theoretical Adequacy

The final layer, theoretical adequacy, connects the dataset back to the conceptual framework guiding the study. Achieving theoretical adequacy requires that the data provides enough depth to refine or challenge the study's guiding constructs. This idea resonates with grounded theory's original emphasis on theoretical saturation, but it is equally relevant in thematic, phenomenological, and narrative traditions. Nelson (2017) introduced the use of conceptual depth criteria to assess whether the dataset contributes sufficient explanatory power to substantiate theoretical claims, thereby ensuring analytical credibility.

Integrating the Layers

These four layers—saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy—are not sequential checkpoints but overlapping dimensions that collectively inform qualitative sample planning. While saturation diagnosis may suggest diminishing returns from further data collection, the researcher must still ask whether the dataset is rich enough, sufficiently diverse, and theoretically robust. This integrated approach (Mpofu, 2020) provides a more nuanced and transparent basis for determining sample size, ensuring that qualitative research moves beyond the narrow pursuit of redundancy to achieve a holistic and meaningful understanding of the phenomenon.

Toward a Multi-Layered Approach: Phased Qualitative Sample Planning

Qualitative sample planning benefits from an iterative, three-phase logic—Early, Middle, and End—within which researchers balance four core criteria: saturation, data richness, diversity of perspectives, and theoretical adequacy (Distefano & Yang, 2023; Hennink et al., 2019). A complementary three-stage saturation-monitoring routine (Early, Middle, Down) provides concrete checkpoints for deciding whether to continue or conclude data collection (Fofana et al., 2020). Merging these models yields the integrated framework below.

Early Phase / Early Stage – Exploration & Initial Saturation Checks

In the early phase of data collection, researchers typically employ purposeful or maximum-variation sampling to capture a broad sweep of participant perspectives within the first five or six interviews, a period when new codes emerge rapidly and information density is highest. This expansive sampling strategy is complemented by open coding, memo-writing, and the use of "saturation grids," which together document emergent themes and provide an immediate check on whether the interview protocol is eliciting data that genuinely address the research questions. Crucially, any saturation diagnosis at this stage remains provisional, deliberately leaving analytic space for unanticipated insights that may warrant refinements in sampling or questioning (Tran et al., 2017).

Middle Phase / Middle Stage – Theme Consolidation & Data Richness

By roughly the sixth to twelfth interview, the study transitions into a middle-phase consolidation period in which theme emergence slows and categorical structures begin to stabilize; at this juncture, researchers often supplement the initial maximum-variation pool with targeted theoretical sampling to foreground underrepresented voices and guard against early dominance effects in the data (Malterud et al., 2016). Analytically, thick description and systematic cross-case comparisons deepen narrative detail, while coding tables or saturation grids quantify the declining rate of novel codes, making visible both the maturing core themes and any residual conceptual or demographic gaps. When gaps surface, they trigger highly focused supplemental sampling, ensuring that diversity, richness, and emergent theory remain in dynamic balance as the project moves toward final saturation.

End Phase / Down Stage – Confirming Saturation & Theoretical Adequacy

In the end phase of data collection—typically after approximately 12 to 20 interviews, though context ultimately dictates the final count—new interviews seldom generate entirely novel codes; instead, they refine and elaborate upon established categories, signaling that code saturation has been reached (Nelson, 2017). At this juncture, the research team concentrates on verifying that the coding framework is stable, that themes are conceptually saturated, and that the accumulated data convincingly support, extend, or challenge the study's theoretical scaffold. Consequently, any additional interviews are conducted only when they promise to sharpen theoretical insight or validate borderline categories, thereby ensuring analytic parsimony without sacrificing conceptual completeness (Braun & Clarke, 2019).

Why This Integrated Framework Matters

Integrating saturation diagnostics with holistic interpretation transforms sample planning from a checklist exercise into a dynamic, evidence-based process that enhances both the rigor and relevance of qualitative research.

1. Adaptive sampling: By embedding phase-by-phase checkpoints, researchers can monitor emerging diversity and thematic coverage in real time. This prevents under sampling in contexts where perspectives are sparse, and curbs unnecessary interviews once genuine saturation is achieved. As a result, data collection becomes more efficient and tailored to the unfolding complexity of the study.
2. Transparent rigor: Systematically documenting code-emergence rates, saturation curves, and richness indices creates a clear audit trail for reviewers and funders. Tools such as saturation grids or richness plots enable precise reporting on when and why data collection ceased, moving beyond vague assertions of "we stopped when themes repeated" to demonstrable, reproducible evidence of sufficiency (Kerr et al., 2010).
3. Conceptual completeness: Framing the question as "How much understanding is sufficient?" shifts the focus from mere counts to the depth and breadth of insights. Aligning saturation with measures of richness and diversity ensures that less frequent but theoretically important perspectives are captured. This multi-layered lens deepens interpretive validity, driving more nuanced conclusions and stronger theoretical contributions (Christou, 2025).

Factors Influencing Data Saturation in Qualitative Research

Data saturation is not a fixed or universally predictable point; rather, it is shaped by a range of interrelated factors that influence how quickly—or slowly—it is reached, as well as how many interviews or data collection events are required. These factors emerge from the design of the study, the diversity of the sample, the complexity of the research questions, and the analytical approaches adopted by the research team (Mwita, 2022).

One of the most critical determinants of saturation is the scope of the study and the nature of the research questions. Studies with narrowly defined and specific questions—such as understanding participants' experiences of a single event—tend to achieve saturation more quickly because the range of possible responses is limited. In contrast, studies that adopt broader, exploratory questions often require more interviews to capture the full variety of perspectives and experiences. The complexity of the phenomenon under investigation also plays a role; research that examines topics with multifaceted social, cultural, or psychological dimensions typically demands larger samples to ensure that all relevant themes and subthemes are adequately represented (Mpofu, 2020).

Sample heterogeneity is another factor that significantly affects saturation. Homogeneous populations, where participants share common characteristics such as occupation, cultural background, or life experiences, tend to yield repetitive patterns more quickly, with saturation often achieved within 5–12 interviews. Conversely, when participants are drawn from diverse backgrounds, representing differences in age, ethnicity, geographical location, or lived experiences, additional interviews are needed to fully capture the range of perspectives. Cross-cultural or

multi-site studies, for example, may require 20–40 interviews or more to achieve adequate saturation across the varied subgroups (Van Rijnsoever, 2017).

The quality and richness of the data also play a decisive role in determining how many participants are needed. Longer, well-conducted interviews that produce detailed, reflective narratives tend to achieve saturation with fewer participants, as each interview provides a wealth of insights and thematic depth. Similarly, when participants possess deep expertise or firsthand experience of the topic—such as key informants or subject-matter experts—the data generated are often dense and analytically rich, reducing the need for larger sample sizes (Nelson, 2017).

Research methodology and analytical approach can further influence the pace at which saturation is reached. In grounded theory studies, the process of theoretical sampling is integral, requiring continuous data collection and comparison until no new categories emerge. By contrast, thematic analysis, which focuses on identifying recurring themes rather than constructing formal theory, may reach saturation earlier. Data collection methods also matter; in-depth interviews and focus groups generally provide richer data per participant compared to more structured methods like surveys, thereby influencing the sample size needed for saturation (O'Reilly & Parker, 2013).

An iterative process of concurrent data collection and analysis is essential for recognizing when saturation occurs. When researchers analyze data as they collect it, they can identify emerging patterns and determine when no new themes are surfacing, optimizing the sample size. However, detailed and nuanced coding strategies can prolong the process, as they are more likely to detect subtle variations and minor themes, thereby delaying the point at which saturation is declared (Lowe et al., 2018).

Finally, the purpose of the study and the level of detail desired are critical considerations. Exploratory studies, which seek to identify a wide range of potential themes, often require more extensive data collection compared to confirmatory studies that focus on validating existing concepts. Similarly, studies that aim to conduct cross-group or cross-site comparisons must achieve saturation within each subgroup to ensure the credibility and completeness of findings (Hennink & Kaiser, 2022).

The expertise of the research team also plays a subtle but important role. Experienced qualitative researchers may recognize patterns and redundancy more quickly, while larger research teams with multiple analysts often bring diverse interpretive lenses that uncover additional themes, thereby increasing the number of interviews needed to reach consensus on saturation (Guest et al., 2020).

Diagnosing and Monitoring Saturation: Practical Strategies

Achieving data saturation is not merely about conducting a predetermined number of interviews but involves an ongoing, iterative process of monitoring and evaluating data adequacy throughout the study (Morse, 2015). This requires a systematic approach that combines careful planning with real-time assessment tools, enabling researchers to recognize when new data no longer contribute substantially to the emerging patterns and insights.

One of the most widely recommended strategies is the use of saturation grids or saturation tables, which track the appearance of new codes or themes across interviews or focus groups. By visually mapping when each theme first appears and when no additional themes are being identified, researchers can determine whether the dataset has reached a point of redundancy (Guest et al., 2020). This method provides not only a practical way to monitor saturation but also a transparent record that can be reported in publications, reinforcing the credibility of the research process.

Another valuable tool is the development of a codebook that evolves alongside data collection and analysis. As interviews are transcribed and coded, researchers can systematically compare new data against existing codes to assess whether new themes are emerging or if the data are reinforcing previously identified patterns (Fofana et al., 2020). A dynamic codebook, updated continuously during the study, serves as a diagnostic instrument, helping the research team to determine when saturation has been achieved and whether the current sample is sufficient to answer the research questions comprehensively.

Memo-writing is another essential practice in diagnosing saturation. Analytical memos, which document the researcher's evolving interpretations, insights, and questions, allow for a deeper engagement with the data and help to track the point at which new information ceases to add meaningful variation (Sechelski & Onwuegbuzie, 2019). These memos not only provide a reflexive record of the analytical process but also encourage critical thinking about whether saturation has been reached or whether additional data collection is necessary to refine or challenge emerging interpretations.

The iterative nature of qualitative research underscores the importance of conducting preliminary analyses in parallel with data collection. Rather than waiting until all interviews have been completed, researchers should code and analyze data as they go, allowing for continuous feedback between collection and interpretation. This iterative process facilitates early identification of saturation while also enabling the refinement of interview questions or sampling strategies in response to emerging findings (Malterud et al., 2016). For example, if new interviews are

consistently confirming existing themes without introducing new ones, this may signal that saturation is close. Conversely, if nuanced differences or overlooked subthemes are detected, additional data collection might be warranted.

Team-based analysis can further enhance the process of diagnosing saturation. When multiple researchers independently code and interpret the data, their combined perspectives often lead to a more rigorous assessment of whether new themes are still emerging. Discussions within the research team about coding patterns, thematic relevance, and data adequacy can help ensure that saturation is determined not based on convenience but through a deliberate and well-documented process (Kerr et al., 2010).

Lastly, transparency in reporting saturation is critical. Researchers should clearly describe how they diagnosed saturation, including the tools, processes, and criteria they used (Leese et al., 2021). This not only strengthens the credibility and trustworthiness of the study but also contributes to the growing methodological discourse on saturation in qualitative research. By demonstrating the iterative and reflective process used to monitor saturation, qualitative studies can provide more defensible and replicable accounts of their sampling decisions.

Implications of Multi-Layered Saturation for Sample Size Planning

The integration of a multi-layered approach to saturation—encompassing saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy—fundamentally redefines how qualitative sample sizes are planned and justified (Mensah, 2025). Rather than relying on rigid numerical targets or simplistic references to saturation, this framework encourages researchers to adopt a more dynamic and context-sensitive approach. By viewing sample adequacy as the result of overlapping dimensions of quality, rather than a singular measure of redundancy, researchers can create sampling strategies that are both methodologically robust and responsive to the unique demands of their study (Mpofu, 2020).

Saturation diagnosis continues to play a pivotal role in guiding sample size decisions. As themes begin to repeat and new interviews add little to the emerging patterns, researchers can use tools like saturation grids and code tracking to determine when data collection may be nearing completion (Guest et al., 2020). However, this diagnostic process must be balanced with an evaluation of data richness, which asks whether the data collected thus far provide sufficient narrative depth and contextual detail to answer the research question. A small number of high-quality, in-depth interviews might achieve both saturation and richness, whereas studies with superficial data collection may require larger samples to generate meaningful insights (Hennink et al., 2017).

The consideration of diversity of perspectives introduces a critical layer of inclusivity into sample planning. It is not enough to achieve saturation if the dataset primarily reflects dominant or homogeneous viewpoints. Sample sizes must be planned with attention to the variability of participant characteristics, experiences, and cultural contexts (Nelson, 2017). For multi-site or cross-cultural studies, this often means ensuring that saturation is achieved not only at the overall study level but also within each subgroup or context. Such an approach prevents the oversight of minority voices and enhances the credibility and transferability of the findings (Hagaman & Wutich, 2017).

Theoretical adequacy serves as the ultimate benchmark of sample sufficiency. Even when saturation and richness are achieved, a dataset may fall short if it does not adequately support or refine the theoretical constructs at the heart of the research (Low, 2019). For studies rooted in grounded theory, this means continuing data collection until categories are fully developed and integrated into a coherent theoretical model (Glaser & Strauss, 1967). For other qualitative approaches, it involves ensuring that the data sufficiently illuminate the central phenomenon and contribute to a robust conceptual understanding (Braun & Clarke, 2019). This layer reinforces the idea that sample size decisions are not just logistical but deeply tied to the analytical goals and theoretical aspirations of the study (O'Reilly & Parker, 2013).

From a practical standpoint, adopting this multi-layered lens has several implications. First, sample size planning must be flexible and iterative, allowing for adjustments as data collection and analysis unfold (Malterud et al., 2016). Pre-determined numbers of interviews can serve as starting points, informed by empirical benchmarks or past studies, but they should not be treated as fixed targets (Vasileiou et al., 2018). Second, documentation and transparency become paramount. Researchers must articulate not only how many participants were included but also why that number was sufficient in terms of saturation, richness, diversity, and theoretical adequacy (Leese et al., 2021). Finally, this approach fosters methodological reflexivity, encouraging researchers to continually question whether additional data will meaningfully advance their understanding, rather than merely increasing the volume of information (Jennings & Yeager, 2025).

By combining these layers, the multi-layered framework provides a more nuanced, evidence-based approach to qualitative sample size planning. It shifts the emphasis from the question of "how many interviews are enough?" to the more critical inquiry of "how much understanding is sufficient to achieve the study's goals?" In doing so, it

offers a practical yet theoretically grounded pathway for researchers to design and justify qualitative studies that are both rigorous and insightful.

DISCUSSION

This study has revisited the concept of data saturation and re-examined its role in qualitative sample size planning, emphasizing the need for a broader and multi-layered framework. While saturation has traditionally been considered the gold standard for determining when enough data has been collected, its application has often been simplistic and inconsistent (Morse, 2015). Our analysis highlights that saturation alone, if treated as a numerical endpoint, risks overlooking critical aspects of qualitative inquiry, such as the richness of narratives, the diversity of participant perspectives, and the theoretical coherence of emerging findings (Braun & Clarke, 2019).

The findings of this conceptual work align with a growing body of literature calling for a more nuanced understanding of saturation. Empirical studies by Guest et al. (2020), Hagaman and Wutich (2017), and Hennink and Kaiser (2022) have provided benchmarks for sample sizes, yet these remain highly context-dependent. At the same time, critical reviews have underscored the risks of treating saturation as a universal standard detached from epistemological traditions (Mpofu, 2020; O'Reilly & Parker, 2013). Our proposed multi-layered framework advances this discussion by integrating saturation diagnosis with complementary criteria—data richness, diversity of perspectives, and theoretical adequacy. Together, these layers address the limitations of saturation as a standalone heuristic and offer a flexible, yet rigorous, approach for guiding qualitative sampling decisions (Vasileiou et al., 2018).

A key insight emerging from this work is that data adequacy is not a singular milestone but a dynamic process unfolding across all stages of qualitative research. Practical strategies such as saturation grids, iterative coding, and memo-writing illustrate that monitoring saturation is as much about critically engaging with data as it is about achieving numerical thresholds (Fusch & Ness, 2015). Importantly, our framework encourages researchers to move beyond repetitive confirmation of themes and to actively seek conceptual depth and variation, ensuring that analysis captures both dominant and less-visible narratives (Nelson, 2017).

Another critical contribution of this discussion is the recognition of contextual and methodological diversity. The conditions under which saturation is achieved vary significantly across research designs. For instance, phenomenological and narrative approaches may prioritize depth of individual accounts, while grounded theory requires iterative sampling to fully develop categories and relationships (Glaser & Strauss, 1967). Similarly, critical and constructivist traditions emphasize that saturation is not a universal endpoint but a pragmatic judgment shaped by research goals and interpretive paradigms (Thorne, 2020). The proposed framework is adaptable to these varied traditions, offering a flexible structure that can be tailored to the goals and epistemological assumptions of each study (Tight, 2023).

The integration of theoretical adequacy within this framework also underscores the connection between sampling decisions and the conceptual objectives of qualitative research. Rather than focusing narrowly on whether new themes emerge, researchers are urged to consider whether the data adequately supports or refines theoretical constructs or generates new interpretive insights (Low, 2019). This approach strengthens methodological rigor while enhancing the credibility and transferability of findings, making them more meaningful for both academic and applied audiences (Jennings & Yeager, 2025).

From a practical perspective, this discussion highlights the importance of reflexivity and transparency in sample size decisions. Researchers should explicitly articulate how and why data collection was concluded, referencing the interplay of saturation, richness, diversity, and theoretical sufficiency (Leese et al., 2021). Such transparency strengthens the trustworthiness of the research process and contributes to ongoing debates about the standards of rigor in qualitative inquiry (Mensah, 2025).

SUMMARY AND CONCLUSION

The determination of sample size in qualitative research is far more complex than simply reaching a numeric target or citing the notion of saturation. While saturation remains an important guiding principle, this paper has demonstrated that it is insufficient as a standalone measure of data adequacy. By tracing the historical origins of saturation, examining its evolving interpretations, and reviewing empirical and theoretical advancements, we have shown that qualitative sample planning requires a broader and more holistic framework—one that moves beyond the narrow pursuit of redundancy.

The proposed multi-layered approach, which integrates saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy, offers a more comprehensive way to assess when enough data have been collected. This framework acknowledges that qualitative inquiry seeks not only repetition of themes but also the depth, nuance, and interpretive clarity necessary to understand complex phenomena. It highlights that data

sufficiency is as much about quality as it is about quantity and that inclusive, well-contextualized insights are vital for producing credible and transferable findings.

Practically, this approach encourages researchers to engage in ongoing, iterative assessment throughout data collection, using tools such as saturation grids, coding frameworks, and memo-writing to monitor when new data cease to contribute meaningful variation. It also underscores the importance of transparency and reflexivity, urging researchers to explicitly justify their sample size decisions with reference to multiple dimensions of data adequacy, rather than relying on a single heuristic. By doing so, qualitative studies can offer stronger methodological justifications and more robust findings that withstand scrutiny.

Ultimately, this multi-layered perspective reframes the question of sample size from "how many interviews are enough?" to the more meaningful inquiry of "how much understanding is sufficient to answer the research question and fulfill the study's objectives?" By integrating the principles of saturation with a holistic interpretation of data adequacy, researchers can design qualitative studies that are both methodologically rigorous and deeply insightful, advancing not only the practice but also the conceptual clarity of qualitative research methodology.

Research Contribution

This study makes several key contributions to the ongoing discourse on qualitative sampling and data adequacy. First, it advances the conceptual understanding of data saturation by critically examining its historical roots, evolving interpretations, and practical challenges. While saturation has been widely referenced in qualitative research, it is often applied as a loosely defined heuristic. By revisiting its theoretical underpinnings in grounded theory and extending its relevance to broader interpretive traditions, this study clarifies its role as a dynamic, iterative process rather than a static endpoint.

Second, the paper introduces a multi-layered framework for planning qualitative sample size, which integrates saturation diagnosis with three additional dimensions—data richness, diversity of perspectives, and theoretical adequacy. This framework moves beyond the narrow focus on thematic repetition to consider the depth, breadth, and conceptual robustness of the dataset. By doing so, it provides a more comprehensive and adaptable approach that can be tailored to different methodological traditions, research scopes, and epistemological assumptions.

Third, the study contributes to methodological rigor and transparency by outlining practical strategies for diagnosing and monitoring saturation, including the use of saturation grids, iterative coding, and memo-writing. These tools not only enhance the credibility of qualitative studies but also provide researchers with systematic ways to document and justify their sample size decisions.

Finally, this work bridges the gap between empirical benchmarks and interpretive considerations in qualitative sampling. By synthesizing empirical studies, meta-analytic models, and theoretical debates, it offers researchers both evidence-based guidance and a reflexive lens for evaluating when data are sufficient to achieve meaningful understanding. In doing so, the study provides a valuable resource for researchers, educators, and practitioners seeking to design high-quality qualitative research that balances methodological flexibility with analytical depth.

Limitations and Future Research Directions

While this study advances the conceptual and methodological discourse on data saturation, several limitations must be acknowledged. First, the proposed multi-layered framework—comprising saturation diagnosis, data richness, diversity of perspectives, and theoretical adequacy—has been developed primarily through a synthesis of existing literature and conceptual reasoning. Although it is grounded in both empirical findings and methodological debates, the framework itself has not yet been empirically tested across diverse qualitative research contexts. Future studies should examine the practical utility of this framework by applying it to real-world research projects and assessing how effectively it guides sample size decisions and ensures data adequacy.

Second, the framework's flexibility, while advantageous, may also present challenges for operationalization. For example, while tools such as saturation grids and coding matrices can help monitor saturation, assessing dimensions like data richness or theoretical adequacy is inherently interpretive and dependent on researcher expertise. This reliance on subjective judgment underscores the need for further methodological work to develop clear, standardized indicators or metrics that can help researchers evaluate these dimensions more systematically.

Third, the discussion of sample size in this paper is largely focused on in-depth interviews and focus groups, which are the most common qualitative methods. However, the dynamics of saturation and data adequacy may differ for other qualitative approaches, such as ethnographic fieldwork, visual methodologies, or digital ethnography, where data are often more unstructured and emergent. Future research should explore how the multi-layered framework can be adapted to these methods, including strategies for diagnosing saturation in more complex, longitudinal, or multi-modal datasets.

Finally, while this paper emphasizes methodological rigor, the socio-cultural and ethical dimensions of qualitative research were not a primary focus. In practice, decisions about sample size and saturation often intersect with issues of representation, power, and inclusivity, particularly when working with marginalized or vulnerable populations. Future studies could extend this framework by integrating ethical considerations—such as ensuring that minority voices are not excluded in the pursuit of saturation—into sample planning and data adequacy assessments.

In light of these limitations, there is considerable scope for future scholarship to refine and validate the multi-layered approach proposed here. Empirical studies that systematically compare traditional saturation-based sampling with this more holistic model could offer valuable insights into its effectiveness. Moreover, methodological innovations—such as computational tools for saturation monitoring or collaborative analytic frameworks—may further enhance the transparency and rigor of qualitative sample planning.

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