

Generating best evidence from qualitative research: the role of data analysis

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Qualitative researchers have been reluctant to set out simple criteria for judging the quality of a qualitative study. Proposed methods for assessing quality are usually too complex to provide clear guidance.¹⁻³ Our solution was to define a hierarchy of evidence specific to qualitative research,⁴ based on clear methodological criteria for each of the four key steps in a qualitative study: constructing a theoretical framework; sampling and data collection; data analysis; and reporting the study. In this paper, our focus is on data analysis. What is critical about data analysis is the process of examining the information collected and transforming it into a coherent account of what was found.⁵ It is, in other words, the route by which study conclusions are reached.

A clear and detailed account of the processes of data analysis is necessary if we are to judge the contribution of a qualitative study to the public health knowledge base.

Qualitative data analysis is clearly not a stand-alone methodological task. A study design depends on the nature of the research problem. The conceptual and theoretical framework also structures the study design⁶ and informs the process of sampling and data collection.⁷ Depending on the study design, the method of analysis varies from thematic analysis,⁸ most commonly used in public health research, to less common methods such as narrative analysis⁹ and discourse analysis.¹⁰ Regardless of the type of analysis, the objective is to understand the subject at hand.¹¹

Abstract

Objective: To outline the importance of the clarity of data analysis in the doing and reporting of interview-based qualitative research.

Approach: We explore the clear links between data analysis and evidence. We argue that transparency in the data analysis process is integral to determining the evidence that is generated. Data analysis must occur concurrently with data collection and comprises an ongoing process of 'testing the fit' between the data collected and analysis. We discuss four steps in the process of thematic data analysis: immersion, coding, categorising and generation of themes.

Conclusion: Rigorous and systematic analysis of qualitative data is integral to the production of high-quality research. Studies that give an explicit account of the data analysis process provide insights into how conclusions are reached while studies that explain themes anchored to data and theory produce the strongest evidence.

Key words: Qualitative research; data analysis; interviews; evidence; theory.

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Our aim in this paper is to describe a process of creating meaning from interview data, in a complete and persuasive way, and to articulate how several steps in the process of data analysis facilitate this process. Our focus is on in-depth interview studies that have the capacity for producing elaborate and detailed accounts of health issues.¹² We describe a data analysis process for thematic analysis that can underpin high-quality qualitative studies producing evidence of sufficient quality that serve as a secure basis for change in policy or practice.

The link between analysis and evidence

Numerous methods text books provide detailed description of qualitative research methods.^{13–15} There is guidance for addressing data analysis when writing a research proposal,¹⁶ when evaluating such proposals¹⁷ and when conducting research.^{5,18} An extensive literature reports the results of interview-based studies (see footnote).

Given the key role that data analysis plays in assessing the quality of a study, it is surprising how often details about the process of analysing qualitative data are missing from the reporting of studies in the public health and medical literatures. Alternatively, studies are presented as though data analysis is self-explanatory, common knowledge or even intuitive. Many qualitative papers restrict an explanation of data analysis to the phrase “categories and themes emerged from the data” or invoke mention of a computer package that has been used to manage the data. The difficulty here is that there is a perception that these standard phrases are code for “data analysis has been done properly”. This lack of detail makes it impossible for readers to judge the adequacy of this key aspect of qualitative research method. The risk is that a qualitative study will then be assessed only on that which distinguishes it most clearly from a quantitative study: selected, moving, often emotional quotations from research participants’ accounts.

The practice of simply making a passing reference to how data analysis was conducted in studies may be due to a misperception that because the data are words (and not numbers), analysis is therefore self-evident. This is akin to a quantitative study referring to analysis of quantitative data without identifying the type of statistics involved or an explanation of what was calculated.¹⁹ It fails to provide clues for how well data were, in fact, analysed and, by association, how convincing or strong is the evidence generated. Significantly, it also fails to give readers a true indication of whether a paper is reporting on the full sample, whether analysis addresses issues of diversity that have most likely arisen, whether data may have been excluded or whether some of the data were (as is highly likely) contradictory to the majority of the dataset.

Interview studies, by their very nature, produce detailed accounts of issues. However, elaborate, selected quotations from data in the reporting of a study are no substitute for high-quality analysis. It

is the task of the researcher to make the link between the accounts that are described and the claim to the knowledge produced. When it comes to analysing interview data, we concur with Rapley that “you should analyse what actually happened – how your interaction produced that trajectory of talk, how specific versions of reality are co-constructed, how specific identities, discourses and narratives are produced”.²⁰ It is also the task of researchers to produce their own narrative, one that convinces the reader that a careful, rigorous, analytic process has been undertaken, connecting analysis with the evidence produced. Thus researchers have a high bar to clear, by way of their professional and ethical responsibility, to do and report data analysis with care and in a comprehensive way. This is the basis on which the quality of the evidence can be assessed and this is the focus of our attention.

The process of data analysis

Data analysis is a systematic and essentially taxonomic process of sorting and classifying the data that have been collected. High-quality papers demonstrate four key steps: immersion in the data, coding, creating categories, and the identification of themes (see Figure 1).

These terms are part of the qualitative research vernacular and appear frequently in research publications. The meanings and variations in the use of these terms are wide-ranging, however, and are often used without any clarification of what differentiates one from the other. Sometimes ‘coding’, ‘creating categories’ and ‘identifying themes’ are used interchangeably or with a presumption that the appearance of such terms in the qualitative research lexicon assumes an implicit meaning. It is precisely because of this variation or assumed knowledge or meaning imbued in these terms that researchers get into difficulties explaining the process of data analysis. Here, we give specific meaning to these steps.

We are not suggesting the steps that follow are done in a linear fashion. Data analysis starts and occurs alongside the interviews that generate the data. Data analysis is time-consuming, requiring constant movement between immersion, coding, categorising, and creation of themes. In systematically making sense of a whole dataset, the researcher moves back and forth through the processes we describe below. The analytical process must engage in a constant process of ‘testing the fit’ as new data are integrated into the analysis. This includes assessing the relevance of the theoretical concepts that are being used in the study as data analysis proceeds. Having a thorough knowledge of the data enables researchers to capitalise on opportunities to broaden and diversify the sample. It allows follow-up on emerging ideas and enables building in new questions that arise during the course of research, rather than mulling over missed opportunities after the interviews have been conducted. This is entirely appropriate, indeed central, to a research method that is, by its very nature, interpretive and where analysis is anchored in the ideas that are located in the data themselves.⁵

Issues relevant to data analysis are not limited to these steps.

Footnote: Interested readers can consult journals such as *Sociology of Health and Illness*, *Qualitative Health Research* and *Social Science and Medicine*.

For researchers working in a team environment, the processes of analysis may be adapted in ways that guard against subjective idiosyncrasies of individual researchers and that ensure rigour, transparency and justification of claims that are made.²¹

Because data analysis in interview-based research occurs concurrently with the field research component, the task of data analysis is closely linked with the quality of the data obtained. Poorly conducted interviews done by researchers inexperienced in following up questions and probing for clarification will hinder the task of even the most expert of analysts. Understanding and interpreting data is difficult to achieve when the analyst has not conducted the interviews, in which case it is critical that other research group members should fully immerse themselves in the data.

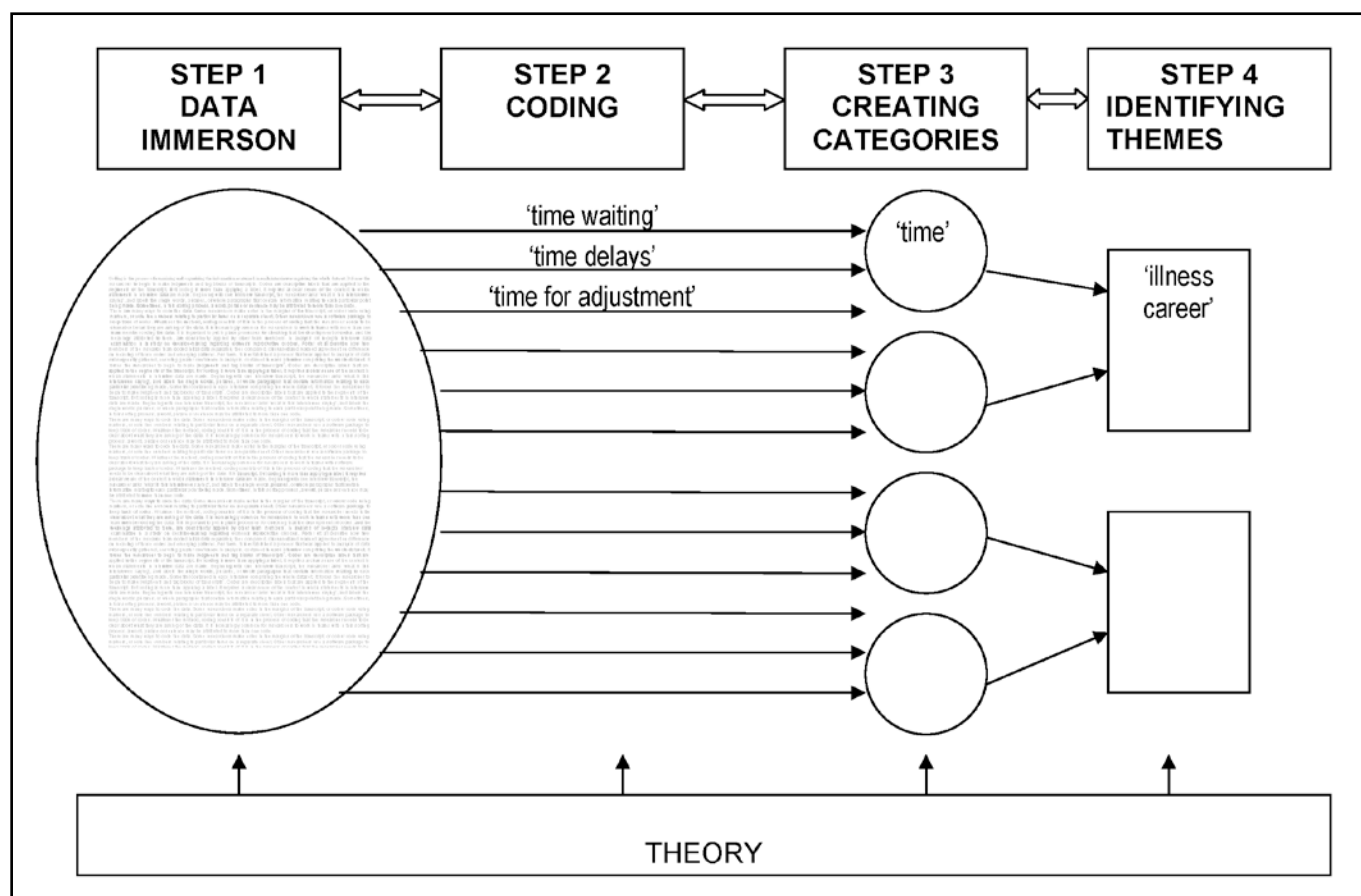
Immersion in the data

The first stage in the analysis process is immersion in the data. The Oxford English Dictionary describes the word *immerse* as meaning “to plunge or sink into a (particular) state of body or mind; to involve deeply, to steep, absorb, in some action or activity”.²² And so it is with immersion in qualitative data. There is no shying away from the fact that data analysis requires the time-consuming process of immersion.

The researcher initially most immersed in the data is the interviewer, ideally a sensitive and observant person. It is therefore advantageous to have interviewers as part of the team that analyses the data, so that their experiences inform the analysis. The interviewer witnesses the details that make up the interview context including hesitations, confidence in answering questions, the tone of participants as well as the shared experiences of researcher and participants, so it is essential to analysis that these observations and experiences be rigorously recorded at the time of interview and subsequently form part of the data. Being able to draw on an understanding of the interview context brings depth to data immersion and enables subsequent interpretation to fully account for the research context beyond interview transcripts.

Repeated reading and re-reading of interview transcripts and contextual data and listening to recordings of the interviews is therefore the first step in analysis. This allows a detailed examination of what is said and stimulates a process where one begins to ‘incubate’ ideas about the possibilities of analysis.²³ Data immersion brings about clarity of the part played by both the interviewer and the research participant, and lays the foundation for connecting disjointed elements into a clearer picture of the issue being investigated. Immersion in the data early has the added benefit of making analysis more manageable rather than waiting to wade through large amounts of data at the one time.

Figure 1: Four steps of data analysis to generate best qualitative evidence.



The process of coding

The second step of data analysis is coding, that is, the process of examining and organising the information contained in each interview and the whole dataset. It forces the researcher to begin to make judgements and tag blocks of transcripts.²⁴ Codes are descriptive labels that are applied to segments of the transcript. There are approaches that pay very detailed attention to the technicalities of coding^{25,26} and the display of qualitative data.²⁷ But coding is more than applying a label. It requires a clear sense of the context in which statements in interview data are made. Beginning with one interview transcript, the researcher asks, “What is this participant saying?”, and labels the single words, phrases, or whole paragraphs that contain information relating to each particular point being made. Sometimes, in this sorting process, a word, phrase or paragraph may be attributed to more than one code.

There are many ways to code data. Some researchers make notes in the margins of the transcript, or colour code using markers, or note line numbers relating to particular items on a separate sheet. Other researchers use a software package to keep track of codes. Whatever the method, coding consists of researchers effectively conducting a detailed, taxonomic process of sorting and tagging data.

It is in the process of coding that researchers need to be clear about what they are asking of the data. If more than one researcher is coding the data it is important to put processes in place for checking that the development of codes, and the meanings attributed to them, are consistently applied by other team members. In analysis of in-depth interview data examining decision-making regarding women’s reproductive choices, Porter et al.²⁸ describe how two members of the research team coded initial data separately then compared, discussed and reached agreement on difference in meaning of those codes and emerging patterns. Hepworth and Murtagh²⁹ are explicit about the analytic steps they took in their study of communicable diseases practice in different sectors of the beauty therapy industry. They pre-defined coding units, performed analysis individually, compared themes in individual interviews then across interviews, consistently testing the relationship between the data and researchers’ interpretations. McDonald et al.³⁰ went further, perhaps beyond what the method requires, in their study of reassurance of cardiology patients. They established a protocol for the coding of interview data based on a multi-level grading scale and then calculated observer agreement by comparing independent scores of two of the observers to detect any significant difference in conclusions.

As more information about the topic is discovered and the researcher works through the transcripts, codes are added, and the meaning of each code may be refined. When this happens, previously coded transcripts are revisited in order to verify that the code still applies, or whether the older transcript may need re-coding. This process involves moving forward and back through the transcripts, drawing on in-depth knowledge connected with the study, returning to the study question, and thinking in terms of systems and theoretical concepts.⁸

Creation of categories

Following initial coding and sometimes occurring alongside the coding process, the data need to be revisited to examine the ways the codes can be linked. Detailed examination of the data is carried out to categorise the ways in which research participants speak about aspects of the issue under investigation. This linking of codes aims to create coherent categories and is the third step in analysis of interview data. It is concerned with looking for a ‘good fit’ between codes that share a relationship.

Very rarely will the full sample have the same experiences. Data usually contain contradictions and exceptions and these need to be sorted into different categories, generating an explanation for everything that is observed or recorded in the data. For example, in a cohort of older people with chronic disease, some may talk about long waiting periods in accident and emergency departments, or others still may talk about delaying seeking health care until symptoms are advanced, and others may comment on the time taken to adjust to the illness. The descriptive labels coded as ‘time waiting’, ‘time delays’, and ‘time for adjustment’ in transcripts about interactions in the health system can all be linked together under the category of ‘time’ (see Figure 1). Each of these different experiences of time will then require separate explanation, preferably linked by an overall theme to explain older people’s responses to the experience of chronic disease.

Analytic categories are ‘saturated’ when there is sufficient information for the experience to be seen as coherent and explicable, for example, in showing that a group of research participants act in the same way because of shared values or life experiences. Unless the difference of an odd-one-out can be explained (often referred to as ‘deviant’ cases³¹), it may be necessary to return to the field to establish if the odd-one-out belongs to a group previously missed, about which data now has to be collected. Eventually, through a process of diversifying and intensifying the data generated and analysed, researchers should be able to make sense of the experience of all people in all categories in the study, or explain the conditions under which exceptions occur.

Many researchers stop at this step and report findings based on categories. This is acceptable if made explicit. A simple, descriptive study is one that can make a modest knowledge claim with appropriately limited conclusions. At this level the focus is on dominant categories (frequently mistaken as themes), with presentation of illustrative quotes. A relatively common problem with the description of categories is that researchers enumerate responses to research questions (‘most’, ‘some’, ‘a few’ participants) to help explain differences in the data, rather than maintaining the emphasis on understanding the meanings in the data based on the full range of accounts. Selectively analysing the data in this way provides only partial evidence and one-sided meaning. It fails to account for the full range of experiences and provides no explanation of those *not* included in the category.

Everingham et al.³² provide an example of such a descriptive study. They were explicit about not generalising results from in-depth interviews of couples’ experience of postnatal depression

(PND). They categorised their data according to various frames that couples used in mothers' and partners' narratives of PND: the need to be 'understood', identity as a mother, perceptions of the partners. All of these categories were illustrated by quotes from the interviews. The authors explored the implications of their findings to the specific field of supporting PND sufferers and their partners, identifying useful research directions to advance knowledge in this field. While useful and convincingly conveyed, the analysis does not extend to the identification of themes.

Identification of themes

The fourth and final step of analysis of interview data is the identification of themes. A theme is more than a category. The generation of themes requires moving beyond a *description* of a range of categories; it involves shifting to an *explanation* or, even better, an *interpretation* of the issue under investigation.³³ The generation of themes requires testing the explanation both with the data and with the theory, specifically referring to the theoretical concepts relevant to the study.⁶ It is this step that is crucial to linking the results from an interview with what we know about people in other settings. The extent to which this is achieved determines the extent to which the study is generalisable to other groups and other settings.

Thus, in the example of the category of 'time' given above, the theme must do more than provide a category – it must provide a link between 'time' and the reasons why 'time' is significant. If we find that patients at early and later stages of working through the experience of a chronic illness have different responses to waiting in line at a hospital, we can use the theme of 'illness career'. Corbin and Strauss developed the theoretical concept of the 'illness trajectory'³⁴ in which illness is seen as a social process over time (that is, a career) with the physiological aspects of an illness and the timing of clinical events of care interacting with the patient's personal biography and the way in which the patient manages everyday social life. It is this literature that allows researchers to link different experiences under the category of 'time' and to locate these experiences in a much more extensive literature covering similar experiences in other contexts and settings, thus increasing the generalisability of the findings.

The identification of themes, rather than categories, is therefore the litmus test of a study that produces stronger evidence. We argue that a high-quality paper identifies themes by linking the categories with social theory, until eventually an overriding explanation is arrived at which makes sense of the various patterns that have emerged at the descriptive level. It is this capacity to explain the social phenomena observed in the study that makes the findings generalisable to other settings, thus providing better evidence. For example, in their generalisable study investigating the socio-cultural implications of sexopharmaceuticals, Potts et al.³⁵ show that some women responded positively to their partners' use of Viagra but there was a range of negative experiences including categories such as dislike of the increased frequency of penetrative sex and feeling pressured to engage in sex. The authors turn to

the theme of sexuality to explain the conflicts that arise with partners. They then turn to the literature on sexuality that argues that the dominant cultural view of male sexuality is that it is urgent and penis-driven while female sexuality is seen as passive and receptive. When ageing males become impotent, the medical and pharmaceutical focus is on restoring penile function rather than considering relationship issues or the views of the women. The extensive theoretical and empirical analysis of sexuality thus provides a much more extensive and profound literature within which we can locate the experience of ageing couples with the men using Viagra. It is through the development of the theme of sexuality that the categories of women's discontent are given depth of meaning.

Conclusion

Rigorous analysis of interview data is a necessary component of the research endeavour and is critical to the generation of good evidence. We have outlined some of the essential features of a process of thematic analysis. Application of these processes ensures the desirable rigour in the creation of meaning from interview data. We are not suggesting a 'one size fits all' approach³⁶ to the technical procedures involved in analysing interview data from qualitative research. There is no prescribed way of analysing a given set of data, but making sense of qualitative data requires a rigorous and systematic approach – which needs to be reported in published papers in such a way that the process can be assessed and judged.³³ We are in favour of developing a compelling narrative in reporting on the data collected in the study. What we are stressing is the importance of backing up the narrative with clear evidence of its relationship to the data. We recognise, of course, that this detailed account can be difficult to provide within the word limit prescribed by many health journals. Researchers can be torn between reducing the details of method or reducing the presentation of data. Since both are important, an appeal for a larger word count may be the only methodologically responsible way of proceeding.

In a climate of increasing use of evidence in public health policy, programs and practice, interview studies that provide a transparent, explicit account of the data analysis process enable judgements to be made about the quality of claims to knowledge. Statements that reveal the influences on pattern recognition and choices in the development of codes, categories and themes from interview data provide much more insight into how an endpoint was reached while studies that explain themes anchored to both data and theory produce the strongest evidence.

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