

# Methodological Triangulation in Midwifery Research

## *La triangulation méthodologique dans la recherche sur la pratique sage-femme*

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### ABSTRACT

Midwifery researchers form an eclectic interdisciplinary group, and utilize a variety of research methods and data analysis approaches. Because of the interdisciplinary nature of midwifery research, there are many opportunities for using mixed-method research designs to enhance theory and knowledge development in this area of inquiry. The benefits of including both quantitative and qualitative research components in the same study are extensive, yet many researchers are uncertain about how to design and interpret mixed methods studies. This paper was written as an introduction to mixed methods study designs in midwifery research. Different approaches to methodological triangulation and its respective strengths are discussed as well as threats to validity in mixed-methods studies. Examples from midwifery research are used to illustrate core concepts.

### KEY WORDS

*methodological triangulation, mixed-method research, midwifery research*

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### RÉSUMÉ

Les chercheuses en pratique sage-femme forment un groupe interdisciplinaire éclectique qui utilisent des méthodes de recherche et d'analyse de données très variées. À cause de la nature interdisciplinaire de la recherche en pratique sage-femme, il existe plusieurs opportunités d'utilisation de modalité d'étude à méthodes multiples en recherche qui contribuent à l'approfondissement du savoir et de la théorie dans ce type d'enquête. Malgré les avantages considérables, lorsque sont incluses dans la même étude les composantes de recherche quantitatives et qualitatives, un grand nombre de chercheurs se questionnent sur la manière de concevoir et d'interpréter les études par méthodes multiples. Ce document a été rédigé comme une introduction aux modalités d'études à méthodes multiples en recherche de pratique sage-femme. On discute de la pertinence des différentes approches de la triangulation méthodologique, leurs forces respectives ainsi que les dangers de validation de l'information dans les études à méthodes multiples. On y retrouve également des exemples de recherche sur la profession sage-femme qui servent à illustrer des concepts fondamentaux.

### MOTS CLÉS

*La triangulation méthodologique, méthodes multiples en recherche, la recherche sur la pratique sage-femme*

*Cet article a été évalué par des pairs.*

Canadian midwifery research is a relatively new field of inquiry, as attested by the small number of academic midwives who do research, and the absence of a Canadian midwifery graduate training program. For this reason, midwifery research is often interdisciplinary, and characterized by a variety of methods and data analysis approaches. Researchers with a background in epidemiology may focus on cohort studies or randomized controlled trials that examine interventions within the midwife's scope of practice or outcomes of midwifery care. These studies add to the evidence base of the efficacy and safety of midwifery care. Those researchers who have come to midwifery from psychology or sociology may be accustomed to use survey methodology to answer research questions. Survey studies are essential in capturing the attitudes and behaviours of a larger group of respondents and often allow for the generalization of findings to a population with similar characteristics.

Other midwifery researchers are trained in qualitative methods and prefer to focus on the lived experiences (phenomenology), approaches to processing a problem (grounded theory) or cultural qualities and location (ethnography) of a select group of midwives or midwifery clients. Qualitative studies seek in-depth understanding of complex thought processes and human behaviours. For instance, researchers may conduct interviews with women who had a homebirth, to better understand how they construct birth or why they decided to give birth at home. Ethnographic studies of birthing practices in developing countries is another example of qualitative research.

Different research methods are derived from paradigms that are accompanied by distinct ontological (view of reality), epistemological (view of how knowledge is acquired), methodological (view of mode of inquiry), and axiological (view of what is valuable) positions.<sup>1</sup> In the first half of the twentieth century, the positivist paradigm dominated most of science. This paradigm is characterized by quantitative methods that are applied for the purpose of testing hypotheses.

Knowledge is objective and accumulated in a building block fashion, with each new study contributing to a growing body of knowledge. The influence of personal values is denied and quality is assessed through external and internal validity, reliability and objectivity.<sup>2</sup> Starting in the 1950s, proponents of the postpositivist movement began questioning the quantitative, deductive approach, but new methods of theory development and data collection did not become popular until the 1970s. During the 1970s and 80s, a variety of qualitative methods were developed, and a new paradigm was born: constructivism.<sup>3</sup> In this paradigm, knowledge is seen as transactional and subjective, and reality as constructed by individuals, each with their own set of beliefs and values. Knowledge is accumulated through vicarious experience and informed by sophisticated reconstructions of social reality.<sup>2</sup>

Mixed-method research designs were first proposed in the late 1950s, and since then studies that combine qualitative and quantitative methods have gained popularity in many disciplines.<sup>3</sup> The benefits of including both quantitative and qualitative research components in the same study are extensive, yet many researchers are uncertain about how to design and interpret mixed methods studies.

This paper was written as an introduction to mixed method study designs in midwifery research. Different approaches to methodological triangulation and its respective strengths are discussed as well as threats to validity in mixed-methods studies. Examples from midwifery research are used to illustrate core concepts.

#### *What is Methodological Triangulation?*

Denzin<sup>4</sup> describes four types of triangulation: data, investigator, theory and methodological triangulation. Data triangulation refers to the collection of data from multiple sources for analysis in the same study. Theory triangulation involves the inclusion of multiple hypotheses and perspectives in the same study. Investigator triangulation occurs when multiple observers, interviewers, and coders work on the same project,

for the purpose of reducing bias and increasing data reliability. Denzin<sup>5</sup> defines methodological triangulation (MT) as the combination of two or more methods in one study of a single phenomenon. There is consensus among researchers that statistical analysis of data (quantitative methods) is best applied when describing or explaining macroprocesses and interpretative analysis of qualitative data (qualitative methods) when trying to understand microprocesses. Combining both methods may render a more comprehensive picture of our social world while minimizing biases inherent in the use of only one method.<sup>6</sup>

Opinions about the main goal or purpose of methodological triangulation differ. Some authors, like Denzin<sup>5</sup> propose that methodological triangulation can enhance the internal and external validity of research findings. Others believe that the philosophical distinctions among quantitative and qualitative methods do not permit the use of triangulation for cross-validation, but can only be used for the purpose of complementarity of quantitative and qualitative results.<sup>7</sup> The complementary purpose of MT implies that one method takes precedence and the other method is applied to supplement or complement the findings of the primary method, thus enhancing theory and knowledge development.

According to Morse<sup>8,9</sup> a research project is either theoretically driven by quantitative (deductive approach) or qualitative (inductive approach) methods and the goal of MT is to fit "the results from each study into a cohesive and coherent outcome or theory." MT can also be used to confirm or revise existing theory. Foss and Ellefsen<sup>10</sup> agree that methodological triangulation or mixed methods leads to a more comprehensive explanation of social phenomena, but they reject the idea that one method complements the other. Instead they propose "true" triangulation, i.e. giving equal weight

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to each method and thinking of MT as an epistemological position in its own right rather than a mix of two different epistemologies.

Kelle<sup>6</sup> acknowledges different methods have different theoretical assumptions about the nature of social reality, but in his view this is a strength of methodological triangulation. Cowman<sup>11</sup> also supports this perspective by stating that the ontological and epistemological assumptions of qualitative and quantitative methods can be reconciled in order to generate a more complete account of social phenomena.

There seems to be a trend toward acceptance of the value of knowledge from different sources, a position Fielding and Shreier have termed "relativistic epistemology".<sup>12</sup> Hanson<sup>13</sup> also seeks to transcend the simplistic ways in which qualitative and quantitative methods are separated and defined, such as subjectivity versus objectivity, systematization, quantification and generalization. She laments the focus on the positivist epistemology in science, and calls for a redefinition of science to include different approaches to knowledge generation. Part of this process is a re-examination of the widely held belief that quantitative methods are more rigorous, objective and valid

than qualitative methods. Onwuegbuzie and Leech<sup>14</sup> dispel this myth by describing a variety of approaches to assess the validity of qualitative studies, e.g. how to prevent bias, weigh qualitative evidence and assess its representativeness.

Sandelowski<sup>11</sup> circumvents the debate about divergent underlying assumptions inherent in qualitative and quantitative methods by proposing that mixed-method studies are not mixtures of paradigms of inquiry per se, but rather paradigms are "reflected in the techniques researchers choose to combine, and how and why they desire to combine them" (p.246-247). In other words, combinations of

qualitative and quantitative approaches occur at the technique level, not the paradigmatic level.

#### *Approaches to MT*

Morse<sup>7</sup> proposes four types of MT, depending on whether qualitative and quantitative data are collected simultaneously or sequentially. With simultaneous triangulation, qualitative and quantitative data are collected concurrently, and results complement each other (the symbol + is used to describe this approach). With sequential triangulation, one method is applied first, usually to inform the implementation of the next data collection phase (see the → symbol). Because Morse does not believe the two methods used in triangulation should be given equal weight, she encourages researchers to first determine whether the research problem is primarily quantitative or qualitative. If a literature review revealed a wealth of studies about the research problem and one can generate empirically grounded hypotheses about the phenomenon under investigation, a quantitative research design would be used to test the hypotheses deductively. A research problem is better approached qualitatively if there is a lack of research and theory building in the area of inquiry, and /or if existing literature or theory appears inconsistent, inadequate or biased.<sup>7</sup>

If the research problem is primarily quantitative, but there are aspects of the problem that cannot be quantified, one should use the QUAN + Qual approach.

*Example: In 2006/2007, the Public Health Agency of Canada initiated a telephone survey with over 6000 randomly selected new mothers. Interviewers assessed many aspects of the maternity care experience of respondents, including satisfaction with their maternity care provider. Results suggested that women who were attended by a midwife rated their birth as a very positive experience more often than women attended by other care providers.<sup>15</sup> While these findings are promising, we do not know why these women felt so positive about midwifery care. In-depth interviews with women who have experienced midwifery and physician attended*

*deliveries would shed more light on aspects of midwifery care that women describe as satisfying.*

If the theory that drives the research is inductively developed from the research itself, and complemented by quantitative methods, it is referred to as QUAL + Quan.

*Example: Murray Davies<sup>16</sup> conducted semi-structured interviews with ten midwifery clients from Southern Ontario who had experienced at least one consultation during pregnancy, birth, or the postpartum period. She found women experienced a conflict between biomedical knowledge and embodied knowledge, and between the hierarchy of physician-centred and woman-centred care during the act of consultation. Findings from the interviews could be triangulated with results from a quantitative study of the prevalence of, and reasons for obstetric consultations among midwifery clients in Ontario. This information could be abstracted from hospital charts or obtained via surveys distributed to Ontario midwives.*

If quantitative methods are used first, and qualitative methods second, Morse uses the notation QUAN → Qual. She sees the primary purpose of the qualitative components as examining outliers that emerged during quantitative analysis.

*Example: In 2006, we sent out an electronic survey to all students at the University of British Columbia to learn about their attitudes towards pregnancy and birth. When asked what mode of delivery students would prefer, 9% opted for a Caesarean section (CS). To better understand why they chose an operative delivery over a vaginal birth, we conducted a thematic analysis of open-ended comments about reasons for the students' preferred mode of birth. This analysis revealed that over half of female students who preferred a CS were afraid of the pain of labour and wanted to avoid it. Over 40% of male respondents chose a CS because they perceived it to be better, safer or healthier for the baby or mother.<sup>17</sup> It would be interesting to follow up this survey with a series of focus groups with students who chose a Caesarean*

section, to gain more knowledge about their perceptions of birth, sources of knowledge about pregnancy and birth, and socio-cultural factors that motivate their choices.

The strength of a QUAN→Qual design is that results from the quantitative component can identify gaps in our knowledge about the findings. They point to qualitative inquiry for clarification and elaboration of areas that cannot be studied quantitatively.

The final type of MT is QUAL→Quan, i.e., qualitative methods take precedence over quantitative methods, which may be used to determine the prevalence/distribution of the phenomenon in the population.

*Example: Kornelsen & Grzybowski<sup>18</sup> conducted in-depth interviews with 76 pregnant women residing in rural and remote areas of British Columbia. Results revealed women who live in areas without local access to maternity services felt stressed and anxious about having to relocate to give birth. The researchers were able to discern different dimensions of stress, including financial worries, separation from family and friends during labour and birth, and concerns over actualizing their vision of birth. These findings provided insight into the psychological impact of evacuated birth, but it remained unclear how many rural women were affected.*

*Based on the qualitative themes that emerged during interviews, Kornelsen et al. developed a 21 item scale that measures stress and anxiety associated with remote birth. This scale was then administered to 187 rural pregnant women, to determine the prevalence of stress and anxiety in this population and to study variations in scale scores as a function of proximity to the nearest obstetric service.*

The strength of a QUAL→Quan design is that the qualitative component will draw attention to the most pertinent issues facing a population and can lead to quantitative item and/or hypothesis generation and testing. In theory, a quantitative

instrument that is informed by qualitative data should have good construct validity, i.e. qualitative data can greatly enhance the operationalization of concepts.

Another typology of mixed methods studies was put forth by Creswell and Plano Clark<sup>19</sup> who distinguish between four mixed methods designs:

- (a) *Triangulation Design*: quantitative and qualitative data are collected and analyzed concurrently, then results are merged to compare, interrelate, or validate results and the interpretation of findings occurs with equal emphasis on both types of data;
- (b) *Explanatory Design*: this approach begins with the collection of quantitative data and if researchers feel the need for further clarification or participant selection they may initiate a qualitative research phase. When interpreting data the emphasis is placed on quantitative data with qualitative results being used to further explain and elaborate research findings;
- (c) *Exploratory Design*: qualitative data are collected and analyzed first, then an instrument or theory based on qualitative results is developed with a need to test it quantitatively. The interpretation of findings occurs primarily along qualitative lines with quantitative results being used to generalize and test the qualitative findings;
- (d) *Embedded Design*: quantitative and qualitative data are collected at the same time, but one type of data serves a supportive role to the other. The aim of this approach is usually to enhance outcome-based quantitative results by adding process-based qualitative data.

Sandelowski<sup>1</sup> developed her own mixed methods design templates based on information from MT scholars, including Morse.<sup>8</sup> Sandelowski's typology is based on qualitative and quantitative approaches to sampling, data collection and analysis that are either given equal priority or used with one approach taking precedence over the other. Not only sequential and simultaneous designs are possible, but methods can be combined iteratively or in a sandwich pattern, e.g., Qual > Quan > Qual, Qual > Quan > Qual, denoting more complex research processes where findings gleaned from one

method inform more than one subsequent stage of data collection and analysis.

#### *Threats to Validity in Mixed Methods Studies*

Using inadequate or inappropriate samples is the greatest threat to validity in mixed methods studies.<sup>8</sup> Quantitative and qualitative findings should be based on two independent samples, because qualitative and quantitative sampling frames have different aims: A larger number of subjects is important for quantitative research to improve generalizability (probability sampling), whereas a qualitative sample is based on a small number of subjects who have in depth experience with the phenomenon under study (purposeful sampling). Some exceptions to this rule are mentioned, e.g. when using the QUAN + Qual approach, one can select a subsample of the larger sample for the purpose of qualitative analysis. However, the subsample should not be random, but represent cases that best illustrate the phenomenon.

Morse also warns that each method (whether primary or complementary) must 'stand alone' with its own criteria for rigor. The example Morse uses is that of a project combining interviews with survey data. Analysis of interview data should be undertaken until saturation is reached, rather than fitting data into preconceived categories generated by quantitative results.

Plano Clark et al<sup>19</sup> have additional suggestions to improve rigour in mixed methods studies. They encourage researchers to clarify the role of timing, weighting and mixing in MT studies. Timing refers to when the quantitative and qualitative methods are implemented, weighting is "the relative importance of the quantitative and qualitative methods for addressing the study's purpose" (p.1556) and mixing refers to how the two methods are meaningfully combined to yield outcomes and explanations above and beyond those gleaned from each method alone.<sup>19</sup> Lack of sufficient integration of qualitative and quantitative methods is a common problem noted by mixed-methods scholars. This

*The strength of a QUAL→Quan design is that the qualitative component will draw attention to the most pertinent issues facing a population.*

shortfall can be overcome if researchers develop research questions explicit to each of the mixed-methods along with a clear data collection and analysis plan that takes into consideration issues like timing, weighting and mixing.

Some authors perceive contradictory findings from MT studies as a threat to validity. According to Morse<sup>8</sup> contradictory findings from a qualitatively driven MT study may indicate that one set of result is invalid and the study findings overall may be inaccurate or incomplete. Contradictory findings from a deductively driven study may indicate

that an incorrect theory was used. On the other hand, lack of congruence between quantitative and qualitative findings can indicate an area that has been overlooked in the variables selected for quantitative analysis. Sandelowski<sup>1</sup> gives an example of how discrepant results between surveys and laboratory tests were addressed through the use of ethnographic interviews, thus strengthening the researchers' understanding of the phenomenon under study.

Erzenberger and Prein<sup>20</sup> go one step further, and propose "dissonance" as a third purpose of triangulation, next to convergence and complementarity. These authors believe that the falsification of underlying theoretical assumptions on the basis of divergent findings from MT studies can be used constructively, e.g. as a starting point for theory refinement or new theory development. Erzenberger et al<sup>20</sup> use the term, "abduction" to describe this process of

*shifting the relationship of the results from dissonance to complementarity by searching for theoretical assumptions that can integrate the findings within a common model (p.148-149).*

This theoretical reflexivity is indispensable when integrating and interpreting findings from MT studies.

## Conclusion

In conclusion, the views of MT scholars differ with respect to the purpose and application of MT, but all include the sequential and simultaneous combination of qualitative and quantitative methods. Comfort levels among authors in addressing contradictory findings and combining qualitative and quantitative sampling frames and data analysis techniques vary greatly, primarily due to differences in opinion with respect to the epistemological congruence between qualitative and quantitative methods. Nevertheless, the number of scholars using MT and writing about it has increased over time, with more and more authors lamenting the separation of methodological approaches.

Because most midwifery researchers have expertise in qualitative or quantitative methods, MT studies require collaboration among midwives with different skills sets, for the purpose of generating more comprehensive explanations of the phenomena they study. Midwifery researchers who are thinking of using a mixed-methods design are encouraged to review MT articles by Morse<sup>8</sup> and Sandelowski.<sup>1</sup> Both authors provide clear and succinct overviews of MT and its various research applications.

## REFERENCES

1. Sandelowski, M. Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies. *Research in Nursing & Health* 2000; 23: 246-255.
2. Guba, EG., Lincoln, YS. Paradigmatic controversies, contradictions, and emerging confluences (pp.191-215). In: Denzin, NK, Lincoln, YS, editors. *The Sage Handbook of Qualitative Research* (Third Edition). Sage Publications; 2005.
3. Teddlie, C, Tashakkori, A. Major Issues and Controversies in the Use of Mixed Methods in the Social and Behavioural Sciences. In: Tashakkori, A, Teddlie, C, editors. *Handbook of Mixed Methods in Social & Behavioural Research* [e-book] Sage Publications; 2003.
4. Denzin N (1970) Strategies of multiple triangulation In *The Research Act* (Denzin N ed), McGraw Hill, New York, pp 297-331.
5. Denzin, NK. *The research act. A theoretical introduction to sociological methods* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall; 1989.
6. Kelle, U. Sociological explanations between micro and macro and the mntegration of qualitative and quantitative methods. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* [On-line Journal], 2004, 2(1). Available at: <http://qualitative-research.net/fqs/fqs-eng.htm> [April 15, 2010].
7. Sale, JEM., Lohfeld, LH., Brazil, K. Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality & Quantity* 2002; 36: 435-3.
8. Morse, JM. Approaches to qualitative-quantitative methodological triangulation. *Nursing Research* 1994; 40(2): 120-123.
9. *Handbook of Mixed Methods in Social & Behavioural Research*. Tashakkori, A. Teddlie, C. Morse, JM. In: Tashakkori, A, Teddlie, C, editors. *Handbook of Mixed Methods in Social & Behavioural Research* [e-book] Sage Publications; 2003.
10. Foss, C., Ellefsen, B. The value of combining qualitative and quantitative approaches in nursing research by means of method triangulation. *Journal of Advanced Nursing* 2001; 40(2): 242-248.
11. Cowman, S. Triangulation: a means of reconciliation in nursing research. *Journal of Advanced Nursing* 1993; 18: 788-792.
12. Fielding, N, Schreier, M. Introduction: On the Compatibility between Qualitative and Quantitative Research Methods. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* [On-line Journal], 2004, 2(1). Available at: <http://qualitative-research.net/fqs/fqs-eng.htm> [April 15, 2010].
13. Hanson, B. Wither Qualitative/Quantitative?: Grounds for Methodological Convergence *Quality & Quantity* 2008; 42:971-111.
14. Onwuegbuzie, AJ, Leech, N. Validity and Qualitative Research: An Oxymoron? *Quality & Quantity* 2007; 41:233-249.

15. Chalmers, B. Dzakpasu, S., Heaman, M. Kaczorowski, J. (2008). The Canadian Maternity Experiences Survey: An Overview of Findings. *Journal of Obstetrics & Gynecology Canada*, 30(3), 217-228.
16. Murray Davis, B. Women's experiences of consultation: Negotiating conflicting models of birth Canadian Journal of Midwifery Research & Practice 2008; 7(2): 22-30.
17. Stoll, K., Fairbrother, N., Carty, E., Jordan, N., Miceli, C., Vostrcil, Y. & Willihnganz, L. "It's all the Rage These Days": University Students' Attitudes toward Vaginal and Cesarean Birth. *Birth* 2009; 36(2), 133-140.
18. Kornelsen J, Grzybowski S. The costs of separation: The birth experience of women in isolated and remote communities in British Columbia. *Canadian Woman Studies Journal* 2005; 24(1): 75-80.
19. Plano Clark, VL., Huddleston-Casas, CA., Churchill, SL, O'Neil Green, D., Garrett, AL. Mixed Methods Approaches in Family Science Research. *Journal of Family Issues* 2008; 29:1543-1566.
20. Erzenberger, C., Prein, G.. Triangulation: Validity and empirically-based hypothesis construction. *Quality & Quantity* 1997; 31: 141-154. qualitative and quantitative approaches in nursing research by means of method triangulation. *Journal of Advanced Nursing* 2001; 40(2): 242 - 248.

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