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Summary

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Chapter 1 | Introduction
Internationally, the interventions used in childbirth vary widely, and there is evidence to suggest that this is also the case in the Netherlands. Interventions in childbirth are useful in certain circumstances to prevent perinatal morbidity and mortality. Some practice variation in childbirth interventions is to be expected, as care is adapted to medical conditions or the woman's preferences. However, practice variation can also be an indicator of unwarranted variation, which can lead to avoidable harm, inequalities in quality of care, and high costs.

Practice variation can be explained by a sociological model that describes factors that interact with practice variation at macro-, meso-, and micro-level. In this thesis, we focus on mechanisms in maternity care that can help explain practice variation at the meso and micro level.

The meso-level, refers to regional collaboration in maternity care networks (MCNs), where community midwives, hospital-based midwives, obstetricians, and other disciplines such as paediatricians and maternity care assistants are collectively responsible for the quality of maternity care in that region. Collaboration in MCNs can be challenging because professionals with different expertise and paradigms need to align and should agree on recommendations in regional protocols.

The micro-level describes the interaction between the woman and the maternity care professional to achieve individual decision-making. Decision-making at the micro-level appears to be influenced by the attitude of the healthcare professional. There are indications that the use of interventions varies between midwives and we want to explore what causes this variation. Therefore, the general aim of this thesis is to generate more knowledge about how midwives' personal and professional factors are related to their clinical decisions about childbirth interventions. This can contribute to reducing unwarranted practice variation in maternity care.

Chapter 2
In this chapter we explored regional variations in childbirth interventions performed in obstetrician-led care in the Netherlands and their associations with interventions and adverse outcomes, controlled for population characteristics.

We performed a register-based study and analyzed data from the Dutch national perinatal register (Perined) from 2010 to 2013, including all singleton births from 37 weeks of gestation onwards. The following interventions were examined: induction and augmentation of labor, pain medication, instrumental vaginal birth, cesarean section, and pediatric involvement after

birth. We compared data across twelve regions and controlled for maternal characteristics such as age, parity, ethnicity, socioeconomic status, and degree of urbanization.

We found the largest variations for the type of pain medication and whether a paediatrician was involved within 24 hours after birth, followed by variation in augmentation after a spontaneous onset of labour. Less variation was found for induction of labour and prelabour caesarean sections, and least for instrumental vaginal births and intrapartum caesarean sections. We found similar variation in intervention rates for births in midwife-led care compared to those in obstetrician-led care at the onset of labour in the same region. This correlation suggests that regional medical culture and practices influence decision-making in midwife-led and obstetrician-led care. Higher of lower intervention rates did not lead to differences in rates of adverse neonatal and maternal outcomes.

The study highlights the need for critical evaluation of regional differences in childbirth interventions in the Netherlands. Major variations may indicate unwarranted interventions. Variation may be explained to some extent by a difference in the degree of implementation of national guidelines between regions. Further research should therefore focus on variations in evidence based interventions and indications for the use of interventions in childbirth.

Chapter 3
In this nationwide retrospective cohort study, we explored variations in childbirth interventions that are used in both midwife- and obstetrician-led care, and in referral rates, place of birth, and care provider. We analysed variations in childbirth interventions across twelve Dutch regions using a national data registry of 614,730 singleton births after 37 weeks' of gestation (2010–2013). We adjusted for maternal maternal characteristics using multivariable logistic regression.

Intrapartum referral rates varied widely for primiparae (55 to 68%) and multiparae (20 to 32%). We found higher rates of postpartum haemorrhage in regions with higher rates of intrapartum referral. Large variations were found in the use of episiotomy and postpartum oxytocin administration. In regions with more home births, an episiotomy was placed less and postpartum oxytocin was administered less often. Remarkable was a north-south division: northern regions had higher rates of home birth and lower rates of interventions (episiotomy and oxytocin use) than southern regions. Adjustment for maternal characteristics did not change the variations in childbirth interventions, suggesting differences in healthcare professional attitudes towards interventions.

The findings highlight the role of the healthcare professional in decisions about the use of interventions. In addition, policy makers and healthcare

professionals should be made aware of the unwarranted variation in childbirth interventions.

Chapter 4
In this descriptive, qualitative study, we used in-depth interviews to explore experiences, beliefs, and values that shape midwives' attitudes toward the use of childbirth interventions. We conducted the interviews (n=20) in June 2019 and used inductive content analysis.

We identified two main themes: (1) attitudes toward interventions, and (2) influences on midwives' attitudes. Midwives in our study described their attitudes toward interventions as oriented to either wait and see or check and control. Care based on wait and see displayed a more supportive style of behaviour, and care based on check and control appeared to display a more directive style of behaviour. Collaboration with other healthcare providers, trust and fear in the process of pregnancy and childbirth, and beliefs about woman-centeredness influenced the attitude of midwives.

We learnt that all midwives in our study had the intention to perform interventions only when appropriate. However, midwives with a wait and see attitude seemed to have a more restrictive approach toward interventions compared with midwives with a check and control attitude. Midwives need to be aware of how their experiences, beliefs, and values shape their attitudes toward the use of interventions. This awareness could be a first step toward the reduction of unwarranted interventions.

Chapter 5
In this chapter, we explored how knowledge and skills influence midwives' clinical decision-making about the appropriate use of childbirth interventions. We interviewed 20 community midwives in June 2019. Participants' clinical experience varied in the use of interventions. The interviews had a narrative approach and we analysed the data using deductive content analysis.

We identified that knowledge, critical thinking skills, and communication skills influenced midwives' clinical decisions about childbirth interventions. Midwives obtained their knowledge through the formal education program and expand their knowledge through reflection on experiences and scientific evidence. Midwives with a low use of interventions seemed to have a higher level of reflective skills, including reflection-in-action. These midwives used a more balanced communication style with instrumental and affective communication skills in interaction with women. They offered women a range of options, encourage shared decision-making, and actively explore patients' preferences. Additionally, these midwives had more skills to engage in discussions during collaboration with other professionals. On the other hand, midwives with a high use of interventions tend to use more directive communication, presenting interventions as standard procedures rather than

optional choices. Midwives with reflective skills, critical thinking skills, and the skills to discuss about care seem to make more personalised decisions about interventions rather than following standardised procedures.

We concluded from these findings that midwives with a low use of interventions seemed to have the knowledge and skills of a reflective practitioner, leading to more personalised care compared to standardised care as defined in protocols. Learning through reflectivity, critical thinking skills, and instrumental and affective communication skills, need to be stimulated and trained to pursue appropriate, personalised use of interventions.

Chapter 6
We analyzed variation between regional protocols, and variation between regional protocols and national guidelines regarding recommendations for induction of labour (IOL). Additionally, we explored the extent to which national guidelines were used in regional protocols and whether this was related to the quality of the national guidelines. The research explored how regional maternity care networks (MCNs) translate national guidelines into protocols and how these variations may contribute to practice variation.

Using a systematic document analysis, we compared four national guidelines with eighteen regional protocols from six different MCNs. The study applied the READ approach (*Ready materials, Extract data, Analyze, Distil*) to analyze the content of these protocols. Additionally, the AGREE II instrument was used to assess the quality of national guidelines, while a analytical framework was developed to evaluate regional protocols.

Our analysis showed a large variation of recommendations in regional protocols, which suggests that regional protocols may contribute to the current practice variation in IOL in the Netherlands. We observed MCNs that adhered to the recommendations set in national guidelines in their regional protocols, other MCNs developed their own recommendations, and for some MCNs this varied per topic. When formulating their own recommendations, regions with a high percentage of IOL added additional risk factors and stricter cut-off values for use of induction as an intervention. Conversely, regions with a low percentage of IOL offered more opportunities to continue midwife-led care. Additionally, in regions with a low percentage of IOL, protocols described more often that woman's preferences should be explored and that the woman is the final decision-maker in using the intervention.

This study illustrates that the translation of national guidelines to regional protocols seemed arbitrary and not very systematic. There seems to be a need for guidance to help healthcare professionals translate national guidelines into regional protocols, while including appropriate contextual factors and allowing women's preferences to ensure that protocols do not lead to over-standardisation.

Chapter 7
In this validation study, we explored if the Birth Beliefs Scale (BBS) can be used to measure beliefs about birth among maternity care professionals in the Netherlands. The BBS questionnaire consists of eleven items that are rated on a five-point Likert scale. The BBS has been validated for pregnant women, and differentiates between views of birth as a natural process (BBS-Nat) and as a medical process (BBS-Med).

The study aimed to assess the scale's content validity, internal reliability, known-group discriminant validity. To establish content validity, the BBS was reviewed by an expert panel. Item 6 was adjusted, before the questionnaire was distributed. In total, 199 maternity care professionals, including community midwives, hospital-based midwives, and obstetricians completed the questionnaire. Data collection took place between November 2022 and March 2023.

A good internal reliability of the BBS was found, indicating consistency in measuring the constructs of medical and natural childbirth beliefs. Natural and medical birth beliefs differed between community midwives, hospital-based midwives, and obstetricians. Community midwives had the highest scores on the natural birth beliefs scale, followed by hospital-based midwives, and obstetricians showed the lowest score. For the medical birth beliefs scale an inverse scoring pattern was seen, with the highest score for obstetricians, followed by hospital-based midwives and the lowest scores for community midwives. Regression analysis indicated that work experience and the type of MCN influenced the scores on the natural birth beliefs scale.

We showed that the BBS is a valid tool for assessing childbirth beliefs among maternity care professionals. The BBS can help to create awareness within professionals of their beliefs and may help to explain practice variation in childbirth.

Chapter 8 | General discussion
This thesis give a broad view of a number of factors that are potential explanations for practice variation in maternity care. It describes exploratory research on the variation in childbirth interventions in the Netherlands and generates further knowledge about how personal and professional factors are related to midwives' clinical decisions about the use of childbirth interventions. We reflected on our outcomes using the sociological model of practice variation and Sutherland and Levesque's framework, which can be used to assess whether the variation is warranted or unwarranted.

National guidelines and regional protocols provide an opportunity for the detailed, evidence-based description of medical practice, however, they should not promote undesirable standardisation of care. Too much standardisation in regional protocols can decrease the existing room for

patients' preferences and other contextual factors. Providing care according to these protocols will make it more difficult to personalise care and possibly increase unwarranted practice variation. Healthcare professionals should be educated about the differences between national guidelines and regional protocols and understand the scientific rationale for the recommendations.

It is essential to recognize that midwives' attitudes, knowledge and skills differ and are influencing factors on practice variation. Midwives may also be influenced by the culture of shared working environments such as MCNs. Based on our research it seems that there should be more focus on midwives as reflective practitioners. More attention to skills as a reflective practitioner could contribute to a more personalised approach to clinical decision-making about childbirth interventions. Additionally, midwives can use these skills in the context of MCNs for effective interdisciplinary collaboration and the development of regional protocols. Together with guidance on how to translate national guidelines into regional protocols, this results in a more nuanced approach that is responsive to patient preferences, addresses uncertainty, and consequently reduces unwarranted interventions.

To develop the skills of a reflective practitioner, midwives need to reflect on their clinical decisions and whether they are influenced by their personal values and beliefs. Midwives can be helped to understand their own practice through the use of reflective models and with intervision meetings with colleagues, which helps to make sense of their experiences and identify patterns in practice.