



Perinatal and maternal outcomes of migrant women in Iceland and their experience of care

Embla Ýr Guðmundsdóttir

Thesis for the degree of Philosophiae Doctor

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Ágrip

Markmið: Meginmarkmið rannsóknarinnar var að skapa þekkingu um hvort og þá hvar þarf að bæta starfshætti innan íslensku barneignarþjónustunnar og hvernig hægt er að tryggja velferð og heilsu kvenna af erlendum uppruna í barneignarferlinu og nýbura þeirra. Markmið fyrsta hluta rannsóknarinnar var að kanna fæðingarútkomu meðal kvenna af erlendum uppruna á Íslandi. Markmið annars hluta rannsóknarinnar var að kanna notkun kvenna af erlendum uppruna á verkjameðferðum við fæðingu og fá þannig innsýn í gæði ljósmóðurþjónustu í fæðingu. Markmið þriðja hluta rannsóknarinnar var að lýsa þörfum, væntingum og upplifun kvenna af erlendum uppruna af umönnun ljósmæðra í fæðingu á Íslandi. Saman munu þessir þrír hlutar rannsóknarinnar gera okkur kleift að öðlast dýpri þekkingu í útkomu þeirra, fá innsýn í umönnunarþarfir þeirra og hvort þær hafi upplifað þarfir sínar í fæðingu uppfylltar.

Bakgrunnur: Nýlegar rannsóknir benda til misræmis í fæðingarútkomum þegar kemur að konum af erlendum uppruna sem búa í hátekjulöndum samanborið við konur með uppruna í landinu. Innflytjendum fjölgar hratt hér á landi en 13,6% þjóðarinnar voru með erlent ríkisfang árið 2020. Samt sem áður er takmörkuð þekking fyrir hendi um heilsufar kvenna af erlendum uppruna á barneignaraldri á Íslandi og aðgengi þeirra að heilbrigðiskerfinu og reynslu af barneignarþjónustu í landinu.

Aðferð: Notast var við tvær lýðgrundaðar ferilrannsóknir auk eigindlegar rannsóknar þar sem notast var við ígrundaða þemagreiningu með langtímasniði á viðtölum, tekin annars vegar á meðgöngu og hins vegar eftir fæðingu. Í rannsókn I og II voru konur af erlendum uppruna skilgreindar sem konur með annað ríkisfang en íslenskt, þar á meðal flóttamenn og hælisleitendur. Þær voru einnig flokkaðar í þrjá hópa, byggt á mannþróunarvísitölu ríkisfangslands þeirra (Human Development Index (HDI)) og áhrif ríkisfangs áætluð. Rannsókn I var söguleg lýðgrunduð ferilrannsókn og náði til kvenna sem fæddu einbura á Íslandi á árunum 1997 til 2018, samtals 92.403 fæðingar. Helstu útkomubreytur voru upphaf fæðingar, örvun, utanbastsdeyging, spangarstuðningur, spangarskurður, fæðingaraðferð, fæðingaráverki í endaparms hringvöðva, blæðing eftir fæðingu, fyrirburafæðing, fimm mínútna Apgar <7, innlögn á gjörgæsludeild nýbura, Vökudeild og burðarmálsdauði. Leiðrétt gagnlíkindahlutföll (aORs) og 95% öryggisbil (CIs) fyrir fæðingarútkomu voru reiknuð út með því að nota aðhvarfsgreiningu. Rannsókn II var einnig söguleg lýðgrunduð ferilrannsókn sem náði til allra kvenna sem fæddu einbura á Íslandi á árunum 2007 til 2018, alls 48.173 fæðingar. Eins og í rannsókn I, voru kerfisbundnar aðhvarfsgreiningar með OR og 95% CI notaðar til að kanna tengslin milli ríkisfangs og notkun verkjameðferðar við fæðingu. Helstu útkomubreytur voru notkun verkjameðferðar með og án lyfja. Rannsókn III var eigindleg langtímarannsókn

með hálfstöðluðum einstaklingsviðtölum sem tekin voru í desember 2021 til maí 2022. Átta konur með pólskan ríkisborgararétt tóku þátt í tveimur viðtölum, á meðgöngu og eftir fæðingu. Viðtölin voru greind með ígrundaðri þemagreiningu.

Niðurstöður: Í rannsókn I fæddu samtals 8.158 konur af erlendum uppruna á rannsóknartímabilinu: 4.401 frumbyrjur og 3.757 fjölbyrjur. Þegar á heildina er litið voru konur af erlendum uppruna með hærri leiðrétt gagnlíkindahlutfall (aORs) fyrir spangarskurði (frumbyrjur: aOR 1,43; 95% CI 1,26-1,61, fjölbyrjur: 1,39 [1,21-1,60]) og áhaldafæðingar (frumbyrjur: 1,14 [1,02-1,27], fjölbyrjur: 1,41 [1,16-1,72]) og lægri aORs fyrir framköllun fæðingar (frumbyrjur: 0,88 [0,79-0,98], fjölbyrjur: 0,74 [0,66-0,83]), samanborið við íslenskar konur. Konur frá löndum með háa mannþróunarvísitölu (HDI \geq 0,900) höfðu svipaða eða betri útkomu en íslenskar konur, á meðan konur frá löndum með lægri HDI en Ísland (HDI $<$ 0,900) höfðu að auki auknar líkur á fylgikvillum fæðinga á móður og barni auk inngripa í fæðingafærið, svo sem bráðakeisara og blæðinga eftir fæðingu. Í rannsókn II var notast við gögn frá 6.097 konum af erlendum uppruna. Konur af erlendum uppruna voru með hærri aOR að nota engar verkjameðferðir í fæðingu (1,23 [1,12-1,34]), samanborið við íslenskar konur. Konur af erlendum uppruna höfðu einnig lægri aOR fyrir notkun nálastungumeðferða (0,73 [0,64-0,83]), raftaugaörvun yfir húð (TENS) (0,92 [0,01-0,67]), sturtu/baðkars (0,73 [0,66-0,82]), ilmkjarnaolíumeðferða (0,59 [0,44-0,78]) og innöndun nituroxíðs (0,89 [0,83-0,96]). Mannþróunarvísitala (HDI $<$ 0,900) ríkisfangslands kvennanna tengdist lægri aORs fyrir notkun ýmissa verkjameðferða í fæðingu. Í rannsókn III var eitt þema myndað úr viðtölum sem tekin voru á meðgöngu: (1) Að finnast þú ekki njóta skilnings, vera ein og hrædd. Tvö þemu voru mynduð úr viðtölum sem tekin voru eftir fæðingu: (1) Að hafa einhvern sem leiðbeinir þér og er með þér í gegnum meðgöngu og fæðingu; og (2) mikilvægi þess að hafa rödd. Tvö þemu voru mynduð í langtímarannsókn á viðtölum sem tekin voru á meðgöngu og eftir fæðingu: (1) Virðingarfull einstaklingsmiðuð umönnun; og (2) mikilvægi þess að deila upplýsingum og fá svör við spurningum þínum.

Ályktun: Niðurstöður rannsóknanna benda til þess að ríkisfang kvenna og HDI ríkisfangslands þeirra er tengt fjölda fylgikvilla móður og fæðingarinngripa, svo sem spangarskurð og áhaldafæðingu. Ennfremur er það að vera af erlendum uppruna á Íslandi mikilvægur þáttur sem gæti takmarkað notkun verkjameðferða án lyfja í fæðingu, sérstaklega á meðal kvenna með ríkisfang frá löndum með HDI $<$ 0,900. Niðurstöður okkar benda til þess að umönnunarþarfir kvenna af erlendum uppruna í nýju landi tengjast góðum samskiptum og tengslum við aðra. Óöryggi var tilfinning sem margar konur létu í ljós í rannsókninni í tengslum við verkjastillingu í fæðingu en einnig í tengslum við samskipti við ljósmóður. Góð samskipti auk þess að koma á tengingu við ljósmóður í fæðingu var þörf allra kvennanna.

Lykilorð:

Ljósmóðurfræði, konur af erlendum uppruna, útkoma, umönnun, reynsla

Abstract

Aims: The overall aim of this thesis was to create a body of knowledge that highlights which practices, if any, need to be improved within the Icelandic maternity care system and how the welfare and health of migrant women and their new-borns´ can be ensured. The aim of Study I was to explore maternal and perinatal outcomes of migrant women in Iceland. The aim of Study II was to explore the use of pain relief methods during childbirth by migrant women and thus get some insight on the quality of intrapartum midwifery care. The aim of Study III was to describe migrant women´s needs, expectations, and experience of midwifery care during childbirth in Iceland. Together, these three studies will contribute to a deeper knowledge of migrant women´s care outcomes and give us insight into their care needs and whether these needs were fulfilled in intrapartum midwifery care.

Background: Recent studies indicate disparities in perinatal outcomes when it comes to migrant women living in high-income countries. Immigration is rapidly increasing in Iceland with 13.6% of the population holding foreign citizenship in 2020. However, limited knowledge exists regarding the health status of migrant childbearing women in Iceland, their access to and use of the healthcare system and their experiences of maternity care in the country.

Method: Two population-based cohort studies and a longitudinal qualitative study were conducted. In studies I and II, migrant women were defined as women with citizenship other than an Icelandic one, including refugees and asylum seekers. They were categorised into three groups, based on the human development index (HDI) score of their country of citizenship, to estimate the effect of country of citizenship on maternal and perinatal outcomes and use of care. Study I was a prospective population-based cohort study which included women who gave birth to a singleton in Iceland between 1997 and 2018, i.e. a total of 92,403 births. The main outcome measures were onset of labour, augmentation, epidural, perineum support, episiotomy, mode of birth, obstetric anal sphincter injury, postpartum haemorrhage, preterm birth, a five-minute Apgar <7, neonatal intensive care unit admission and perinatal mortality. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for maternal and perinatal outcomes were calculated using logistic regression models. Study II was also a prospective population-based cohort study which included all women who had a singleton birth in Iceland between 2007 and 2018, i.e. a total of 48,173 births. As in study I, logistic regression analyses, with ORs and 95% CIs, were used to investigate the relationship between migrant backgrounds and the use of pain management during birth. The main outcome measures were the use of non-pharmacological and pharmacological pain management

methods. Study III was a longitudinal, qualitative study involving individual semi-structured interviews conducted from December 2021 to May 2022. Eight women with a Polish citizenship participated in two interviews during pregnancy and after birth. The interviews were analysed using reflexive thematic analysis.

Results: In study I, a total of 8,158 migrant women gave birth during the study period, 4,401 of them primiparous and 3,757 of them multiparous. Overall, migrant women had higher aORs for episiotomy (primiparas: aOR 1.43; 95% CI 1.26 - 1.61, multiparas: 1.39 [1.21-1.60]) and instrumental births (primiparas: 1.14 [1.02-1.27], multiparas: 1.41 [1.16-1.72]) and lower aORs for induction of labour (primiparas: 0.88 [0.79-0.98], multiparas: 0.74 [0.66-0.83]) compared to Icelandic women. Migrant women from countries with a high HDI score (≥ 0.900) had similar or better outcomes than Icelandic women, whilst migrant women from countries with a lower HDI score than that of Iceland (< 0.900) had high aORs for maternal and perinatal complications and interventions, such as emergency caesarean and postpartum haemorrhage. In study II, the data from 6,097 migrant women were included. Overall, migrant women had higher aORs for no use of pain management (1.23 [1.12-1.34]), when compared to Icelandic women. Migrant women also had lower aORs for the use of acupuncture (0.73 [0.64-0.83]), transcutaneous electrical nerve stimulation (TENS) (0.92 [0.01-0.67]), shower/bath (0.73 [0.66-0.82]), aromatherapy (0.59 [0.44-0.78]), and nitrous oxide inhalation (0.89 [0.83-0.96]) than Icelandic women. Women from countries with a HDI score < 0.900 had lower aORs for the use of various pain management methods. In study III, one theme was generated from all the interviews conducted during pregnancy: Feeling not understood, alone and scared. Two themes were generated from the interviews conducted after birth: (1) having someone who guides and accompanies you through pregnancy and birth; and (2) the importance of having a voice. Two themes were generated from the longitudinal analysis of the interviews conducted during pregnancy and after birth: (1) respectful individualized care; and (2) importance of sharing information and getting answers to your questions.

Conclusion: The studies' findings indicate that women's citizenship and the HDI score of their country of citizenship are significantly associated with a range of maternal and perinatal complications and interventions, such as episiotomy and instrumental birth. Furthermore, being a migrant in Iceland is an important factor that could limit the use of non-pharmacological pain management, especially for migrant women with citizenship from countries with a HDI score < 0.900 . Our results suggest that migrant women's care in a new country is related to good communication and connection with others. Insecurity was a feeling expressed by many of the women in our study, especially regarding pain relief in labour and communication. Ensuring good communication as well as establishing a connection to the midwife was an overall need among all the women in our study. These findings necessitate a further look into inequality in healthcare in Iceland. By acknowledging migrant women's diversity in experiences of security, knowledge and

personal values, we can implement policies that will help us take better care of migrant women in maternity care.

Keywords:

Midwifery, migrants, outcome, care, experience

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Contents

| | |
|--|--------------|
| Ágrip | iii |
| Abstract | v |
| Acknowledgements | ix |
| Contents | xi |
| List of Abbreviations..... | xv |
| List of Figures | xvii |
| List of Tables | xviii |
| List of Original Papers | xix |
| Declaration of Contribution | xxi |
| 1 Introduction..... | 1 |
| 1.1 Migrant’s health | 1 |
| 1.1.1 Equity in healthcare | 2 |
| 1.2 The health of migrant women..... | 3 |
| 1.2.1 The healthy migrant effect..... | 3 |
| 1.2.2 Socio-economic status (SES)..... | 3 |
| 1.2.3 Culture | 3 |
| 1.2.4 Access to healthcare | 4 |
| 1.2.5 Quality of health care | 5 |
| 1.3 Aspects of pregnancy and birth..... | 5 |
| 1.3.1 Maternal and perinatal outcomes | 5 |
| 1.3.2 Pain relief during labour..... | 8 |
| 1.3.3 Migrant women’s experience of intrapartum care | 9 |
| 1.4 The Icelandic setting | 10 |
| 1.4.1 Migrants in Iceland | 10 |
| 1.4.2 The human development index (HDI) | 10 |
| 1.4.3 Policy..... | 11 |
| 1.4.4 Maternal care in Iceland | 11 |
| 1.4.5 Intrapartum care in Iceland | 12 |
| 1.5 How can health systems promote equity in health? | 12 |
| 1.6 The theoretical model/framework..... | 12 |
| 1.7 A summary of and the rationale for this study..... | 13 |
| 2 Aims | 15 |
| 2.1 Aim of Study I..... | 15 |

| | | |
|----------|---|-----------|
| 2.2 | Aim of Study II..... | 15 |
| 2.3 | Aim of Study III..... | 15 |
| 3 | Materials and Methods..... | 17 |
| 3.1 | Study I. Challenges in migrant women’s maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes | 18 |
| 3.1.1 | Sample and data collection..... | 18 |
| 3.1.2 | Study measures..... | 19 |
| 3.1.3 | Study analysis | 20 |
| 3.2 | Study II. The use of pain management in childbirth among migrant women in Iceland: A population-based cohort study | 21 |
| 3.2.1 | Sample and data collection..... | 21 |
| 3.2.2 | Study measures..... | 21 |
| 3.2.3 | Study analysis | 23 |
| 3.3 | Study III. “She’s going to give me information and support that no one else can”: A longitudinal qualitative study on migrant women’s care needs, expectations, and experiences of midwifery care during birthing in Iceland..... | 23 |
| 3.3.1 | Sample and data collection..... | 23 |
| 3.3.2 | Study analysis | 24 |
| 3.4 | Ethical considerations..... | 25 |
| 4 | Results | 27 |
| 4.1 | Study I..... | 27 |
| 4.1.1 | Childbirth interventions | 27 |
| 4.1.2 | Maternal outcomes | 29 |
| 4.1.3 | Neonatal outcomes..... | 31 |
| 4.2 | Study II | 31 |
| 4.2.1 | The use of any pain management methods | 31 |
| 4.2.2 | The use of non-pharmacological pain management methods..... | 32 |
| 4.2.3 | The use of pharmacological pain management methods..... | 32 |
| 4.3 | Study III | 34 |
| 4.3.1 | Interviews during pregnancy..... | 34 |
| 4.3.2 | Interviews after birth | 35 |
| 4.3.3 | Longitudinal analysis..... | 36 |

| | |
|---|------------|
| 5 Discussion | 39 |
| 5.1 Challenges in migrant women’s maternity care in a high-income country | |
| – Study I..... | 39 |
| 5.1.1 Childbirth interventions | 39 |
| 5.1.2 Maternal outcomes..... | 40 |
| 5.1.3 Neonatal outcomes | 40 |
| 5.2 The use of pain management in childbirth among migrant women in | |
| Iceland - Study II..... | 41 |
| 5.2.1 The use of any pain management methods..... | 42 |
| 5.2.2 The use of non-pharmacological pain management methods | 42 |
| 5.2.3 The use of pharmacological pain management methods | 42 |
| 5.2.4 Access | 43 |
| 5.3 Migrant women’s care needs, expectations, and experiences of | |
| midwifery care during birthing in Iceland - Study III..... | 43 |
| 5.3.1 Communication and a connection to the midwife..... | 44 |
| 5.4 Strength and limitations..... | 45 |
| 5.4.1 Strength and limitations of Study I..... | 45 |
| 5.4.2 Strength and limitations of Study II..... | 46 |
| 5.4.3 Strength and limitations in study III..... | 46 |
| 5.5 Implications for practice and future research | 47 |
| 5.5.1 Future research | 48 |
| 6 Conclusions | 49 |
| References | 51 |
| Original Publications | 65 |
| Paper I | 67 |
| Paper II | 83 |
| Paper III | 97 |
| Appendix A | 119 |
| Appendix B | 123 |
| Appendix C | 125 |
| Appendix D | 127 |
| Appendix E..... | 129 |

List of Abbreviations

| | |
|---------|--|
| WHO, | World Health Organisation |
| SES, | Socio-economic status |
| CS, | Caesarean section |
| BMI, | Body mass index |
| MiMo, | Midwifery model of care |
| aOR, | Adjusted odds ratio |
| eg, | Exempli gratia/ for example |
| HDI, | Human development index |
| ICM, | International Confederation of Midwives |
| OASI, | Obstetrical anal sphincter injury |
| TENS, | Transcutaneous electrical nerve stimulation |
| EEA, | European economic area |
| IMBR, | Icelandic medical birth registry |
| ICD-10, | International statistical classification of diseases and related health problems, tenth revision |
| NCSP, | Nordic medico-statistical committee classification of surgical procedures |
| NICU, | Neonatal intensive care unit |
| OR, | Odds ratio |
| CI, | Confidence interval |

HIV, Human immunodeficiency virus
NIC, Nursing intervention classification.
ATC, Anatomical therapeutic chemical classification
w, Weeks
IUGR, Intrauterine growth restriction
PROM, Premature rupture of membranes

List of Figures

| | |
|---|----|
| Figure 1 An illustration of the difference in definition between the terms equality and equity ¹⁹ | 2 |
| Figure 2 Themes | 34 |

List of Tables

| | |
|---|-----|
| Table 1 An overview of the three studies included in this PhD thesis..... | 17 |
| Table 2 Prevalence (%) of, crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for maternal and perinatal outcomes of primiparous women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (1997-2018) ^a | 28 |
| Table 3 Prevalence (%) of, and crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for maternal and perinatal outcome of multiparous women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (1997-2018) ^a | 30 |
| Table 4 The crude odds ratios (ORs) and adjusted ORs (aORs) with 95% confidence intervals (CIs) for the use of non-pharmacological and pharmacological pain management methods by birthing women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (2007-2018). | 33 |
| Table S 1 Ascertainment and missing data for Study I outcome variables..... | 119 |
| Table S 2 Background characteristics of primiparous and multiparous migrant women with missing data on citizenship who gave birth to a singleton in Iceland during the study period (1997-2018) ^a | 123 |
| Table S 3 Prevalence (%) of, and crude (OR) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) and all numbers analysed for maternal and perinatal outcome of primiparous and multiparous migrant women with missing data on citizenship who gave birth to a singleton in Iceland during the study period (1997-2018) ^a | 125 |
| Table S 4 Ascertainment for Study II outcome variables. | 127 |

List of Original Papers

This thesis is based on the following original publications, which are referred to in the text by their Roman numerals (I, II, III):

- I. Guðmundsdóttir, E.Ý., Gottfreðsdóttir, H., Hálfhánsdóttir, B., Nieuwenhuijze, M., Gissler, M., & Einarsdóttir, K. (2021). Challenges in migrant women's maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes. *Acta Obstetrica et Gynecologica Scandinavica*, 100(9), 1665-1677. DOI: 10.1111/aogs.14186
- II. Guðmundsdóttir, E.Ý., Nieuwenhuijze, M., Einarsdóttir, K., Hálfhánsdóttir, B. & Gottfreðsdóttir, H. (2022). Use of pain management in childbirth among migrant women in Iceland: A population-based cohort study. *Birth*, 49(3), 353-582. DOI: 10.1111/birt.12619
- III. Guðmundsdóttir, E.Ý., Nieuwenhuijze, M., Rúðolfsdóttir, A.G. & Gottfreðsdóttir, H., (2023). "She's going to give me information and support that no one else can": A longitudinal qualitative study on migrant women's care needs, expectations, and experience of midwifery care during birthing in Iceland. Submitted for publication in *Women and Birth*.

Other relevant publications:

- IV. **Guðmundsdóttir, E.Ý.**, Einarsdóttir, E.L. & Gottfreðsdóttir, H. (2021). Fæðingarstillingar kvenna á Íslandi árin 2012-2018 og helstu áhrifaþættir: Lýðgrunduð ferilrannsókn (Women's birth positions in Iceland during 2012-2018 and main influencing factors: A population-based cohort study). *Ljósmaðrblaðið*, 2, 32-37.
- V. **Guðmundsdóttir, E.Ý.**, Vigfúsdóttir, L. & Gottfreðsdóttir, H. (2023). Tíðni fyrirburafæðinga hjá íslenskum og erlendum konum árin 1997-2018 og helstu áhrifaþættir: Lýðgrunduð ferilrannsókn (Preterm birth among Icelandic and migrant women in Iceland during 1997-2018 and main influencing factors: A population-based cohort study). *Læknablaðið*, 109(2), 75-81. DOI:10.17992/lbl.2023.02.729
- VI. Kristjánsson, V.B., **Guðmundsdóttir, E.Ý.**, Skarphéðinsdóttir, S.J., Gottfreðsdóttir, H. & Bjarnadóttir, R.I. (2023). Svæfing í bráðakeisaraskurði meðal íslenskra og erlendra kvenna á Íslandi á árunum 2007-2018 (Comparative study of the frequency of anesthesia in emergency caesarean sections with regard to citizenship during 2007-2018.) Submitted for publication in *Læknablaðið*.

VII. Gunnarsdóttir, Á.B., Þórkelsson, Þ., Bjarnadóttir, R.I. & **Guðmundsdóttir, E.Ý.** (2023). Fyrirburafæðingar á Íslandi 1997-2018: Hefur uppruni mæðra áhrif á útkomu barna? (Preterm births in Iceland 1997- 2018: Does the mothers' origin affect the neonatal outcomes of preterm births). Submitted for publication in Læknablaðið

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Declaration of Contribution

The doctoral candidate, Embla Ýr Guðmundsdóttir (EÝG) wrote this doctoral thesis under guidance of Helga Gottfreðsdóttir (HG) and Marianne Nieuwenhuijze (MN) supervisors, and the doctoral committee Kristjana Einarsdóttir (KE), Berglind Hálfhánsdóttir (BH) and Annadís Gréta Rúdólfsson (AGR). Grants were applied for by HG and EYG with guidance from HG.

Study I: EÝG drafted the manuscript and analysed the data, and each named author EÝG, HG, BH, MN, KE, and Mika Gissler (MG), has substantially contributed to the study design, data interpretation and revising this manuscript.

Study II: EÝG drafted the manuscript and analysed the data, and each named author EÝG, HG, MN, KE and BH, has substantially contributed to the study design, data interpretation and revising this manuscript.

Study III: Embla Ýr Guðmundsdóttir did the investigation for the research, worked with resources, project administration, formal analysis, data curation and writing the original draft. EÝG, MN, HG and AGR, have substantially contributed to the study conceptualization, visualization, methodology and writing, review and editing.

1 Introduction

Immigration is steadily increasing worldwide, with almost one in 10 people in the World Health Organization (WHO) European Region estimated to be an international migrant.¹ Iceland is no exception with 14.1% of its population holding foreign citizenship in 2019,² similar to Norway³ and Denmark.⁴

There are many definitions for the term migrants. A lack of specificity is demonstrated by the range of terms used interchangeably to refer to migrants. A basic definition of migration is 'the movement of a person or people from one country, locality, place of residence, etc., to settle in another'.⁵ In this project, we use the words *migrant women* to refer to women who have moved from their country of origin and take up residence in another country. The move could either be a voluntary decision (e.g. to find better employment) or the result of adverse social, economic and political conditions in the country of origin. Those who move voluntary or as a result of unfavourable conditions in their home country are categorised into the following subgroups: refugees, asylum seekers, settlers, circular migrants and transit migrants. Migrants may remain in their host country ('settlers'), reside provisionally in a country with the aim of moving to another country ('transit migrants'), move back and forth between countries ('circular migrants', such as seasonal workers), seek protection from persecution and serious human rights violations ('asylum seekers') or qualify for an international protection after fleeing their country because of risk of persecution and serious human rights violation ('refugee'). In this study, we acknowledged the heterogeneous nature of migrant women and their experiences.

Research shows that while some migrant women have maternal and perinatal outcomes similar to native-born women,⁶⁻¹⁰ other groups of women, such as refugees, asylum seekers, undocumented migrants and women from certain geographical regions, are more prone to receiving suboptimal maternity care.¹¹⁻¹³

1.1 Migrant's health

The inequity that migrants face with regards to their state of health and access to quality health services has been demonstrated by global researchers and international organisations,¹⁴ such as the WHO¹⁵ and the European Public Health Association¹⁶. The term inequity refers to those unfair, avoidable differences that arise from poor governance, corruption and cultural exclusion.¹⁷ When equity is ensured, everyone gets access to the same opportunities. Inequity is sometimes confused with the term inequality; however, these terms are not interchangeable. Inequality in healthcare refers to the uneven distribution of health resources because of lack of resources or even genetic

factors.¹⁸ When equality is ensured, everyone is granted the same access. However, this can only work if everyone has the same start in life; therefore, equity needs to be ensured first. The difference in the definition of these terms is illustrated in Figure 1.

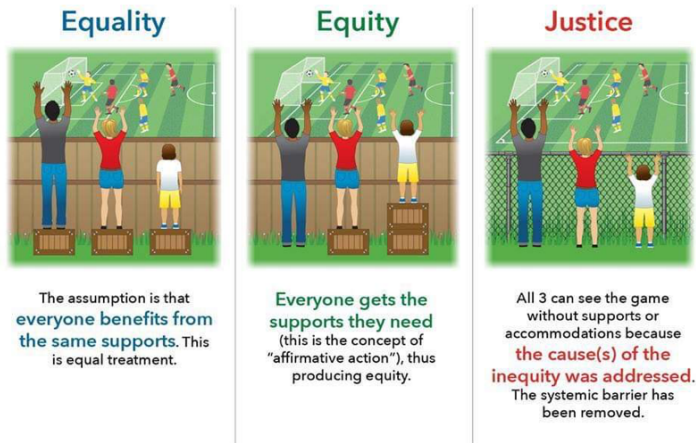


Figure 1 An illustration of the difference in definition between the terms equality and equity¹⁹

1.1.1 Equity in healthcare

In every country, health care systems are developed to meet the needs of most of its population. However, providing all people in a country with the same level of care may be insufficient for vulnerable populations, such as migrants. Equity in healthcare does not mean being able to use the same services as everybody else; rather, it is about adapting existing services and care for all population groups in a country to the needs of migrant women.²⁰ Even if a migrant has national health insurance as a citizen in the host country, with equal access to health services, their ability to benefit from these services depends on their autonomous decision making, socio-economic status and social network. To ensure health equity, extra resources are needed for some individuals/groups so that everybody can make full use of the services provided. Also, much of the differences across the world are due to uneven distribution of wealth between nations as well as within each country; this has resulted in health inequity, where people with higher income can access private health services in addition to the national health scheme.²⁰ There is a notable shortage of research comparing health interventions among majority and minority groups because it has been standard practice to exclude minority groups from clinical trials and research. Therefore, it is not known whether all treatments are equally effective for or cater equally to the needs of these different groups. Because there has been such scant research, we also do not know what needs the care has to cater for, and this has caused grave inequity.¹⁵

1.2 The health of migrant women

Theories regarding better or adverse health outcomes among migrant women compared to native-born women include the healthy migrant effect,²¹ socio-economic disadvantage,^{21,26} suboptimal use or access to care,^{22,23,25-28} underlying conditions in the mother^{21,22,24,26,29} and the stress of migration.^{25,26}

1.2.1 The healthy migrant effect

The 'healthy migrant effect' refers to observations that at immigration, migrants have a better health status than the rest of the population in their country of birth and to some extent, the population in their host country. This is believed to be because healthy individuals are more likely able to undertake and withstand the rigors of migration.³⁰

1.2.2 Socio-economic status (SES)

Currently, migration has increased and over greater distances than before. Although temporary employment played a significant role in this development, environmental and social factors have been identified as more important factors.³¹ Migrants are likely to be young people, and women comprise 48% of all international migrants.³² The proportion of female migrants is the highest in Europe (51.9%) with a median age of 42.3 years.³² Migrants often work below their level of qualifications,^{33,34} and the socio-economic status (SES) of migrants is generally lower than that of native-born people, although there are individual differences. Theories have been put forward that SES is a part of the causal chain between migration status and health, thus acting as a mediator instead of a confounder, especially if being a migrant determines, to some extent, a person's SES, for example through a mechanism of social exclusion.¹⁵

1.2.3 Culture

In other countries, active integration of migrant women into the host country's population and policies which promote social participation have been linked to lower risks of adverse maternal and perinatal outcomes.³⁵ However, despite the growing number of migrants and increasing global attention to migrants' health,¹⁶ the integration policy in Iceland has been criticised for lacking an infrastructure that can identify and respond to migrants' specific health needs and access to care.²⁶

The longer a woman has resided in the country with increasing language fluency and the younger her age at migration, the more likely she is to adopt the attitudes, behaviours and traditions of the country.¹⁵ Even healthy migrant women who had a better health status than the population in the host country at the time of immigration can, within 5-10 years after immigration, lose their health advantage. They may bring their cultural preference for caesarean section (CS) or even seek interventions like an epidural if this is viewed as being associated with better care in the host country.¹⁵ Also, having a partner who is

native of the host country seems to affect migrant women's use of maternity service, such as the use of epidural during labour.³⁵

Cultural competence is a concept used in the context of professionals who relate to unfamiliar systems of meaning, which requires receptiveness and communication skills. Professionals in these situations are encouraged to critically focus on their worldview, values and implicit presuppositions, and adopt an attitude of humility and openness.¹⁵ The training and education of healthcare providers is the main prerequisite for developing cultural competence. However, these should not only be directed at caregivers but also at administrators, researchers, managers and policymakers.¹⁵

1.2.4 Access to healthcare

Access to healthcare refers to the ease with which people can make use of a healthcare service when they need it. Possible indications of problems with healthcare access include the underutilization of care provision and delaying seeking healthcare until problems are more advanced and symptoms more severe and often too late to be managed successfully.¹⁵ Also, accessibility of health education, health promotion and preventive care relates to the ease with which healthcare workers successfully reach and influence their intended target groups.²⁰

Migrants may come from countries with very different healthcare systems. Their assumptions about the behaviour they can expect from the health professionals as well as what is expected from them may not correspond to the contextual reality.¹⁵ Indeed, learning to use the health system in the host country is an important component of acculturation. Integration programmes for immigrants are a suitable context for initiatives to stimulate health literacy; this requires intersectoral cooperation among the different agencies involved. Regarding the skills needed to negotiate the system, it is an unfortunate paradox that users who are more socially excluded are likely to have a greater need for care but at the same time be less capable of getting it.¹⁵

Language barriers and subsequent difficulties in communication seem to affect migrant women's experiences of the childbirth process.³⁷ Continuously informing the woman about the course of childbirth and the factors relating to, for example, child well-being, supervision and treatment at birth can be of great importance. If women are well informed, they have a more positive experience at childbirth; however, if they do not receive sufficient information, they may perceive the experience negatively and even consider it abusive.³⁸ If midwives fail to show enough care and support during childbirth, the women feel helpless and do not consider themselves in control.³⁹ Several studies have highlighted that women without a good grasp of the English language may even consider 'straightforward' births to be stressful and frightening, and those who experience complications such as a CS are likely to experience even greater trauma.³⁷

In order to achieve equity in care for all women, it has been suggested that support from a doula or cultural mediators in the context of childbirth might benefit migrant women in some birth settings.⁴⁰ Cultural mediators, chosen for their familiarity with the culture and 'life-world' of the service user, bridge the social and cultural gap between healthcare service providers and users.¹⁵ It is not always possible to separate linguistic barriers from social and cultural ones, and it is increasingly common to find the role of interpreter being extended to that of 'cultural mediator'.¹⁵ This concept has been pioneered by a few countries (mainly the United Kingdom, the Netherlands, Belgium, Spain, France and Italy) and is now increasingly being adopted elsewhere.⁴¹ Cultural mediators can play a very important role in reducing barriers to access and bridging the gap between migrant and minority communities and the healthcare system.¹⁵

1.2.5 Quality of health care

There are several approaches to assessing the quality of health services. Bearing in mind that these services consist of healthcare, health education and health promotion, the criteria for assessment will depend on the component in question. There are basically three ways in which the quality of healthcare can be conceptualised: (1) by measuring the outcomes in quantitative terms of how successful an activity is in achieving its intended aim; (2) by measuring subjective concepts such as satisfaction and experience, often related not only to the outcome of the care but also to the experience of receiving it; and (3) by conducting procedural evaluation to examine whether care is being provided as intended; this is often done as a preliminary stage to the previously mentioned methods of assessment.¹⁵ Suboptimal quality of care as well as unequal levels of quality in maternity care can exacerbate inequity. Recognising that there are racial and ethnic differences in healthcare and attending to our own complicity and the system characteristics that contribute to them may ultimately help to advance equity, improve quality and attenuate disparities. Continuous support in labour has been linked to a shorter duration of labour and a decreased need for CS, analgesics, oxytocin and forceps.⁴² It has also been associated with higher levels of satisfaction with the birth experience.⁴²

1.3 Aspects of pregnancy and birth

1.3.1 Maternal and perinatal outcomes

Several studies have been conducted on perinatal outcomes among migrant women in high-income countries. Increased risks of adverse perinatal outcomes have been reported among migrant women in the Nordic countries compared with the host population.^{21-25,27,28,43,44} However, the results of previous studies have been inconsistent regarding mode of birth,^{14,21-24,28} maternal outcomes²³⁻²⁵ and interventions,^{21,22} reflecting heterogenous study populations, designs, and exposure group definitions.

The benefits of initiating antenatal care early in pregnancy are undisputed.⁴⁵ There are reports that women with fewer antenatal care visits than recommended are more likely to have complicated births^{46,47} and that increased mortality from congenital anomalies may partly be related to restricted access to screening during pregnancy.⁴⁸ The WHO antenatal care model recommends that the first antenatal care visit takes place within the first trimester (i.e. gestational age of <12 weeks) and then an additional seven visits subsequently.⁴⁹ In the clinical guidelines for antenatal care by the National Institute for Clinical Excellence, which was translated and localised for Iceland, pregnant women are encouraged to seek professional healthcare as early as possible in pregnancy, typically within the first 10 weeks of pregnancy,⁵⁰ so that they can obtain and use evidence-based information to plan their pregnancy and benefit from antenatal screening and health promotion activities.

It is estimated that between 2% and 36% of women begin antenatal care after the first trimester in European countries.⁵¹ Several studies have indicated a relationship between country of origin and the timing of the first antenatal visit^{22,43,46} as well as the number of antenatal visits.⁴⁶ Studies have also indicated a higher rate of low 5 minute Apgar score^{21,24} and being small for gestational age,^{21,22,24,25,28} among children born to migrant women; others have reported a higher rate of preterm birth among these women.^{21,22,44} These associations and the importance of starting antenatal care early in pregnancy raises questions about whether the most vulnerable women in each country have access to appropriate healthcare.⁵¹ It also raises questions about whether the relation between country of birth and complications indicate that certain migrant groups should be given more attention in maternity care.⁴⁷

In a small retrospective study conducted in Iceland in 2014, several outcome measures were explored comparing migrant women with native-born Icelandic women.⁶ It was found that the migrant women were more likely to have normal weight, be married and older than the native-born Icelandic women and that they had fewer diagnosis of complications during pregnancy.⁶ More migrant women had few antenatal visits (<7) while native-born Icelandic women often had more than 16 antenatal visits (4.1%/2.7%). No migrant woman was diagnosed with mental illness; this is in contrast to the 2.7% of native-born Icelandic women who were.⁶

There has been a substantial rise in obstetric interventions in most developed countries since the 1970s.⁵¹ Countries vary in their use of interventions, and it is important to explore how this development has affected migrant women in each country.⁵¹ The incidence of induction of labour has risen in many countries,⁵²⁻⁵⁴ but in studies where there is a distinction between migrant women and native-born women, migrant women are less likely to have their birth induced.^{7,52-54} In an Irish study by Walsh et al.,⁷ women from Eastern Europe were less likely to be induced for prolonged pregnancy than Irish women, their mean duration of spontaneous labour was significantly shorter and they were more likely to deliver vaginally after a spontaneous onset of labour. The authors

explained the differences in obstetric interventions using the 'healthy migrant effect'. Other studies have shown similar results.^{8,9} This was also the result in the small Icelandic study previously mentioned, where 25.3% of native-born Icelandic women were induced, a number which exceeds the 18.5% for migrant women ($p=0.036$).⁶

Other interventions such as episiotomy have been shown in some studies to be more likely among migrant women. In a study by Hennegan et al., 28.9% of migrant women versus 17.8% of native women had an episiotomy.⁹ However, in a study by David, Pachaly and Vetter conducted in Germany, there was little to no difference in episiotomy rate between the German and migrant primiparas, although there was a significantly lower rate of episiotomy among multipara migrant women compared to the German multipara women.⁸ Similar findings were reported by Zanconato et al. in Italy, where 25.6% of Italian women had episiotomy versus 23.3% of migrant women (adjusted for age, not parity).¹⁰

Increased rate of CS has been reported in some studies although when separated by ethnicity the opposite becomes apparent.²² The rising CS rate in many Western countries has been associated with a wide variation between and within countries.^{51,55} Also, CS rates appear to vary between migrant and native-born women. In a study in Norway, published in 2000, migrant women had a higher rate of CS than women from Norway.⁵⁶ The rate of CS was more than 20% among women from India, the Philippines, Brazil, Chile and Africa, while women from Vietnam had the lowest rate (10.1%). A similar rate was found among women from Turkey, Morocco and Pakistan compared to that among women from Norway (12.4%). After adjusting for all the study covariates, including maternal age, parity, education and place of delivery, the crude excess risk of undergoing CS (compared to Norwegians) remained elevated among women from the Horn of Africa (2,7%) and Chile/Brazil (6,4%).⁵⁶ The most important diagnosis associated with the high prevalence of CS in this study were foeto-pelvic disproportion, foetal distress, and prolonged labour.⁵⁶

Contrastingly, a 2011 prospective study in Ireland showed that intrapartum CS rates were significantly lower among migrant primiparous women compared to Irish women.⁵³ The authors suggested that this could potentially be explained by the younger age and lower induction rates among migrant primiparous women.⁵³ In a Finnish study by Malin and Gissler in 2009, primiparous migrant women had CS less often than women with Finnish origin (18.2% vs. 19.7%, $P < 0.05$). However, when studied by ethnicity, women from Africa (40.5%, $P < 0.001$), Latin America and Caribbean (31.0%, $P < 0.05$), Southeast Asia (28.6%, $P < 0.001$) and Somalia (28.8%, $P < 0.001$) had significantly higher CS rates, while the lowest CS rates were noted among women from the Nordic (12.8%, $P < 0.01$), East European (13.0%, $P < 0.001$) and Baltic (14.8%, $P < 0.05$) countries. The difference in CS rates between multiparous women of Finnish origin and migrant origin women was statistically insignificant (13.1% and 12.7%, respectively).²²

In the Icelandic study previously mentioned, the overall CS rate was similar between migrant women and native-born Icelandic women. The rate of intrapartum CS was however higher among migrant women compared with the native-born Icelandic group (13.1% versus 11.2%), while the native-born Icelandic women had higher rates of elective CS than migrant women (5.7% versus 3.8%).⁶ Despite the increasing global attention to migrants' health,¹⁷ there is limited knowledge on the perinatal health of migrant women in Iceland.

1.3.2 Pain relief during labour

Promoting comfort is an integral part of the 'art' of midwifery care.⁵⁷ Therefore, all women are entitled to being listened to and receiving evidence-based information on both pharmacological and non-pharmacological methods of pain relief during childbirth so that they can make informed choices about intrapartum care as per their personal needs. Non-pharmacological pain management methods are beneficial on many levels. They enhance women's satisfaction with intrapartum care, give them a feeling of competence and control during labour,⁵⁸ help them cope with the pain⁵⁸ and have little or no side effects compared to pharmacological pain management methods,⁵⁹ thus reducing the need for obstetric interventions.⁵⁷ However, these methods may not be sufficient for all women, and some may still experience suffering due to the pain, increasing their risk of needing obstetric interventions.⁵⁸ The circumstances in which pharmacological pain management methods are offered are therefore very important.

The increased use of pharmacological pain management methods among women in labour has been associated with primiparity,⁶⁰ macrosomia,⁶¹ higher maternal body mass index (BMI),^{35,61} maternal stature (high birthweight among short women),³⁵ advanced maternal age,⁶¹ high income,⁶⁰ permanent employment,⁶⁰ being married,⁶⁰ not being a migrant,^{8,35,62-66} longer stay in the host country,³⁵ induction of labour,⁶⁷ lack of one-on-one continuous support,⁶² participation⁶⁸ and non-participation⁶⁹ in antenatal education programs, higher number of antenatal care visits,⁴⁷ cultural preference⁷⁰ and the woman's health issues, such as anxiety, pre-eclampsia⁶⁰ and diabetes.⁷¹ The increased use of non-pharmacological pain management methods has been associated with primiparity,⁶⁰ higher levels of education,⁶² and not being a migrant.⁶⁶

Additionally, place of birth⁶⁰ is a variable associated with the use of pain management methods. The use of pain management methods varies among groups of women with different cultural backgrounds, but the information regarding whether migrant women use pharmacological^{8,22,35,62-64,66,70,72} and non-pharmacological methods^{22,62,66} more or less than the host population is inconsistent. In the previously mentioned Icelandic study, 48.3% of the native-born Icelandic women used epidural during labour compared to 42.3% of migrant women. The native-born Icelandic women also used non-pharmacological pain management methods more often than migrant women (12.0% versus 9.4%).⁶ Other studies have indicated that the use of epidural during labour

depends mostly on the maternal country of origin suggesting that the expectations women bring with them influence their use of epidural analgesia. Findings from a Swedish study showed that compared with native Swedish women, women from Chile, Iran, Poland and Finland used epidural more often, after adjustments for perinatal and sociodemographic confounders.³⁵ It was also reported that women from Somalia, Iraq, Turkey and Yugoslavia used epidural less often;³⁵ however, having a native Swedish partner increased the use of epidural among migrant women.³⁵ This is in accordance with the above-mentioned Irish study by Ismail et al., where migrant women used epidural during birth more often than their native Irish counterparts.⁵³

Despite the increased global attention to migrant women's health during childbirth and inequities in the quality of care and access to maternity services for this group,⁷³ few studies have been conducted on the use of various pain management methods during labour among migrant women.

1.3.3 Migrant women's experience of intrapartum care

Several studies have explored the experience of maternity care among migrant women and revealed a relationship between women's experience of social inequality and their access to pre-, intra- and post-partum care.⁷⁴⁻⁷⁶ Migrant women are in a vulnerable position when pregnant and giving birth because of their expectations, circumstances and need for adaptability.^{74,77} Individualised and sensitive care appears to be insufficient, and maternity care services must be adapted to migrant women's expectations of support and cultural differences, where their own strength and resources are acknowledged.⁷⁴

Midwifery support during birth is one of the key factors that contribute to a positive childbirth experience.^{39,78} Studies have shown four main factors that influence women's childbirth experience: personal expectations, support from caregivers, the quality of the relationship between a woman and her caregiver, and women's participation in decision making.⁷⁹ Regarding women's satisfaction with childbirth, the influences of pain, pain relief and intrapartum medical interventions are not as powerful as those of the attitudes and behaviors of the caregivers.⁷⁹ Promoting and enhancing comfort is integral to the 'art' of midwifery care.⁵⁷

In a study by Berg et al.⁸⁰ who examined an evidence-based, woman-centered, model of midwifery care in Sweden and Iceland, findings about women's and midwives' experiences of childbirth were synthesised from 12 qualitative studies. These researchers described being able to provide woman-centered care as a 'balancing act' (p. 86). The midwifery model of care (MiMo) consists of three central intertwined dimensions; the midwife is with the woman and uses *grounded knowledge*, forms a *reciprocal relationship* and *creates a birthing atmosphere*. These three central dimensions are performed by the midwife through a *balancing act* in a *cultural context which comprises promoting or*

*hindering norms for conducting a woman-centred care.*⁸⁰ Promoting and enhancing comfort is integral to the 'art' of midwifery care.⁵⁷

1.4 The Icelandic setting

1.4.1 Migrants in Iceland

At the end of the year 1996, foreign citizens living in Iceland made up 2.2% of the Icelandic population;⁸¹ their number increased to 14.1% at the beginning of the year 2019.⁸¹ Poland was the country of origin for most of the migrant women (34.6%); the Philippines came second with 5.9%, followed by Lithuania 4.9%, other Nordic countries (4.7%), Germany (4.2%), Thailand (3.9%), Latvia (2.6%), Romania (2.2%) and the United States (2.1%).⁸⁵ Thus, the majority of migrant women in Iceland come from countries where health, education and the economy are considered to be good.⁸²

Migrants in Iceland are mostly aged between 15 and 49 years (75%), and 50% of them have a median duration of stay in the country of less than 5 years.⁸³ The majority (68%) mention work as their reason for moving to the country.⁸⁴ However, they often do not have jobs that suit their education level and have long and non-standard working hours compared with the Icelandic-born population.⁸⁵ Of all migrants, 45% are women,⁸³ 43.9% of whom work in production jobs.⁸⁶ This is an interesting example of intersectionality, where various social and political identities combine to create different modes of discrimination and privilege.⁸⁷

In papers I and II, we defined migrant women as those with citizenship other than Icelandic, due to data registration. For the native women in this project, we will use the term Icelandic women, which we defined as women with Icelandic citizenship.

1.4.2 The human development index (HDI)

The human development index (HDI) is an index compiled for countries by the United Nations Development Program.⁸² The idea behind the HDI is to assess the development of living standards in each country without looking at economic growth alone. The HDI is composed of indicators for health, education and living standards including life expectancy at birth, the average length of schooling for adults over 25, the expected length of education for children of school-age and gross national income per capita.⁸² It can therefore be said that the HDI is several factors combined into one to create a simple picture of the standard of living in each country and thus make them comparable in a simple way. However, the HDI fails to capture all aspects of living standards such as equality, poverty, security, and empowerment, and this must be considered when using the index.

1.4.3 Policy

The WHO stated that reproductive health included the right of access to appropriate health care services that will enable women to safely go through pregnancy and childbirth and provide couples with the best chance of having a healthy infant.⁸⁸ The International Confederation of Midwives (ICM) has set forth an aim to improve the standard of care provided to women, babies and families throughout the world through the development, education and appropriate utilisation of the professional midwife. In keeping with this aim, the ICM outlined a code to guide midwifery education, practice and research.⁸⁹ This code acknowledges women as persons with human rights, seeks justice for all people and equity in access to healthcare, and is based on mutual relationships of respect, trust and dignity for all members of society.⁸⁹

The challenge of achieving equity in maternity care for migrant women appears to be related to ensuring the provision of appropriate care by managing and supporting educational, relational, and culturally sensitive services.⁹⁰ Migrant women are in a vulnerable position when pregnant and giving birth, as they struggle to find meaning in their new country, cope, communicate, connect and achieve a safe pregnancy and childbirth. To overcome this, their own strengths and resources must be acknowledged and their access to health care must be improved. Continuity of care is a way to meet their needs and help them find a sense of meaning in their new country.⁷⁴ In response to cultural diversity, health care systems need to pay attention to the need for culturally and linguistically appropriate services so as to create a culturally competent healthcare system,⁹¹ as poor communication and cultural differences may lead to misunderstandings, lack of confidence and insecurity (especially for female refugees) during pregnancy and childbirth.⁹²

1.4.4 Maternal care in Iceland

The maternity service in Iceland is part of a publicly funded healthcare system; it is mostly free of charge, except for legal migrants who must pay for health insurance during the first 6 months of their stay in Iceland if they are relocating to Iceland from outside the European Economic Area (EEA),²⁶ which can affect their access to care. After this 6-month period, migrants automatically become members of the Icelandic social insurance system, regardless of their nationality. Migrant women are entitled to a free interpreter;⁹³ however, the need for and use of interpreters in maternity care in Iceland is unknown. The recommended number of antenatal care visits for an uncomplicated singleton pregnancy is ten for healthy primiparous women and seven for multiparous women. Antenatal care is delivered by midwives through the primary care system, where most women have their own midwife, and women receive care in hospitals in case of complications and medical risks. Usually, midwives provide information on pain management methods during antenatal care visits and in antenatal education programs.

Women must pay for attending such programs but can apply for reimbursement from their union.

1.4.5 Intrapartum care in Iceland

Iceland does not offer a national continuity of care model, and women in labour generally do not know their midwife beforehand. However, continuous support from a midwife during labour is encouraged. Most women (over 80%) give birth in the National University Hospital, a tertiary hospital in the capital, Reykjavík, where two-thirds of birthing women have a residence.⁹⁴ All women in labour are attended to by midwives, who collaborate with an obstetrician if complications arise. Migrant women are entitled to free interpreter service during childbirth, although the need for and use of these interpreters is unknown. All birth places in Iceland offer various non-pharmacological pain management methods during labour; some primary birth places additionally offer nitrous oxide inhalation, while some secondary and all tertiary birth places offer all non-pharmacological and pharmacological pain management methods mentioned in this study. The pain management methods are free for all women with Icelandic health insurance. The Icelandic birth setting is further described in an earlier publication.⁸⁰

1.5 How can health systems promote equity in health?

In a briefing on policy by the WHO Regional Office for Europe, the measures required to promote health equity for migrants in health systems were summarised,¹⁵ alongside the need to involve a multisectoral approach, including health, employment, education, housing and immigration policies. All levels of government were urged to act in a coordinated way and involve all other relevant partners such as health service providers, insurance systems, companies, research and educational organisations, communities and users' organisations. Effort must be devoted to increasing the public's awareness of health equity.

1.6 The theoretical model/framework

The cultural competence/healthcare disparities framework is a theoretical framework that focuses on the intersection between cultural competence and healthcare disparities. It seeks to address the challenges faced by diverse populations in accessing healthcare that is culturally sensitive, equitable, and of high quality.

Cultural competence refers to the ability of healthcare providers and systems to effectively deliver care to patients from diverse cultural backgrounds. It involves understanding and respecting the cultural beliefs, values, and practices of patients, as well as addressing potential language barriers and ensuring appropriate communication. Cultural competence also involves recognising and mitigating the impact of cultural biases and stereotypes that may affect the quality of care provided.⁹⁵

In contrast healthcare disparities refer to differences in access to healthcare, utilisation of health services and health outcomes among different population groups. These disparities can be influenced by various factors, including race, ethnicity, language, socioeconomic status and immigration status. Healthcare disparities are often rooted in systemic and structural factors, such as unequal distribution of resources, discrimination, and lack of culturally competent care.⁹⁵

By applying this framework to this thesis on perinatal and maternal outcomes of migrant women in Iceland and their experience of care, we investigated how cultural competence, or the lack thereof, may contribute to disparities in the access and utilization of healthcare, and the health outcomes for this specific population. We explored the role factors such as language barriers, cultural norms and expectations, availability of interpreters, cultural adaptation of healthcare practices, and the role of healthcare providers' cultural sensitivity play in shaping the experiences and outcomes of migrant women during the perinatal and maternal period. The cultural competence/healthcare disparities framework provides a lens through which we can analyse and address the challenges faced by migrant women in Iceland, ensuring that their unique cultural and healthcare needs are recognised, respected, and effectively met.

1.7 A summary of and the rationale for this study

Limited knowledge exists regarding the health status of migrant childbearing women in Iceland, their access to and use of the healthcare system and their experience of maternity care in the country. Most women will become pregnant and have one or more babies in their lifetime. According to the EURO-PERISTAT project⁴⁸ healthy mothers and children are the building blocks for a strong future in Europe. As such, optimal care during pregnancy, birth and the postpartum period is of importance in all societies which aim to maximise the safety and wellbeing of childbearing women and their future generations.

This study attempts to fill the knowledge gap regarding migrant childbearing women in Iceland. Furthermore, it attempts to identify possible hindrances and inequity in maternity care as well as explore factors that promote the health and meet the healthcare needs of migrant childbearing women in Iceland. Hopefully, this knowledge will positively affect the practice of midwives and other maternity care providers, the curriculum for future midwives in Iceland and policies regarding how we take care of migrant women in the country.

In the thesis, the included papers will add knowledge on the needs of migrant childbearing women in Iceland. By examining maternal and perinatal outcomes of migrant women, their use of pain relief methods during birth and their expectation and experience of midwifery care during childbirth, I believe we can highlight the ways in which we can improve their wellbeing and reduce health inequity among migrant women in Iceland.

The concept of 'care in childbirth' was the focus in the study. When comparing quality of care, the indicators of the outcome of pregnancy, stillbirth, neonatal and infant mortality rates, are frequently used within countries in comparison, as well as internationally between countries. Looking at care through a different lens brings attention to studies on comfort during birth. Research on the processes of care during labour suggests that when comforting measures are used and comfort is experienced, that comfort may be a strengthening factor during labour and may enable women to use less analgesia.⁹⁶ Alleviation of pain is identified as a means of providing comfort and supporting women in labour.⁹⁷ We can only measure variables that are listed and available in our registration system and so we looked into birth outcomes as well as women's use of pain-relieving methods during childbirth. To achieve a deeper understanding, qualitative approach was used to study migrant women's experience of care during childbirth, their needs, if/how they were met and their feeling of comfort in childbirth.

2 Aims

The aim of the thesis was to create a body of knowledge that offers a deeper understanding into which practices need to be improved within the Icelandic health care system to ensure the welfare and health of migrant women and their newborns'. We analysed the birth outcomes of migrant women in Iceland, their use of pain relief methods during birth and their experience of care during childbirth. This will increase the understanding on the interplay between service delivery and core outcomes, in addition to migrant women's experience of care.

2.1 Aim of Study I

This study's primary objective was to explore maternal and perinatal outcomes among migrant women in Iceland and thus gain insight on the quality of maternity care.

2.2 Aim of Study II

The aim of this study was to explore the use of pain relief methods during birth by migrant women and thus gain insight into the quality of intrapartum midwifery care.

2.3 Aim of Study III

The aim of this study was to describe migrant women's needs, expectations and experience of midwifery care during childbirth in Iceland and thus gain a deeper understanding of their care and care needs and assess whether they have experienced their needs being fulfilled in intrapartum midwifery care.

3 Materials and Methods

The thesis consists of three independent studies and papers that, together, describe the background and birth outcomes of migrant childbearing women in Iceland and their experience of maternity care in the country. Mixed methods were used in the research. Studies I and II were population-based cohort studies, while Study III was a longitudinal qualitative study. An overview of the three studies is outlined in Table 1 and further described in the following chapters.

Table 1 An overview of the three studies included in this PhD thesis

| Study | I | II | III |
|------------------------|---|---|---|
| Purpose | Explore maternal and perinatal outcomes among migrant women in Iceland. | Explore the use of pain relief methods during childbirth by migrant women. | Describe migrant women’s needs, expectations, and experience of midwifery care during childbirth in Iceland. |
| Research questions | Is there a difference in the maternal and perinatal outcomes among migrant women in Iceland compared to Icelandic women. | Is there a difference in the use of pain relief methods during birth among migrant women in Iceland compared to Icelandic women. | How do migrant women experience their trajectory through the maternal healthcare system in Iceland? |
| Design | Quantitative. | Quantitative. | Qualitative. |
| Participants | All women who gave birth in Iceland between 1997 and 2018, including 92,403 births. | All women who gave birth in Iceland between 2007 and 2018, including 51,791 births. | Eight pregnant women of polish origin receiving antenatal care in Iceland. |
| Data collection method | Data from the extensive Icelandic Medical Birth Register Database. | Data from the extensive Icelandic Medical Birth Register Database. | Convenience sampling. Participants were recruited in antenatal care and through a Facebook group. Individual interviews were conducted in the antenatal and postpartum periods. |
| Independent variables | Country of citizenship (Icelandic/other). | Country of citizenship (Icelandic/other). | - |
| Dependent variables | Caesarean section (O82.0; O82.1; O82.2; MCSA10; MCSA00), induction of labor (O83.8; MASC00; MAX02; MAX09), instrumental delivery, small for | Bath or shower (NIC1340), acupuncture therapy (AXXA00), relaxation (NIC6040), massage (NIC1480), hot/cold pack (NIC1380), sterile water injection | - |

| | | | |
|---------------|--|---|--|
| | gestational age (weight and length below 10th gentile for gestational age), neonatal resuscitation (endotracheal intubation/ external cardiac massage), admission to special care, Apgar score less than 7 at 5 minutes, postpartum hemorrhage (O72.0-2), episiotomy, OASI, and pain relief methods. | (NIC2317), TNS (NIC1540), essential oil therapy (NIC1330), epidural (WAA307), Entonox gas (WAA740) and pudendal (WAA230). | |
| Data analysis | Descriptive analysis. Regression analysis. | Descriptive analysis. Regression analysis. | Reflexive thematic analysis. |
| Article title | Challenges in migrant women’s maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes | The use of pain management in childbirth among migrant women in Iceland: A population-based cohort study | ‘She’s going to give me information and support that no one else can’: A longitudinal qualitative study on migrant women’s care needs, expectations, and experience of midwifery care during birthing in Iceland |
| Journals | AOGS | Midwifery | Women and birth |

3.1 Study I. Challenges in migrant women’s maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes

Study I was a population-based cohort study which explored the maternal and perinatal outcomes of migrant women who gave birth in Iceland between 1997 and 2018.

3.1.1 Sample and data collection

The population in this cohort study included women who gave birth to a singleton in Iceland between 1 January 1997, and 31 December 2018. The data were prospectively collected by the Icelandic Medical Birth Registry (IMBR), which is a routinely collected nationwide centralised administrative registry, and obtained retrospectively by researchers. The data included information on all births in Iceland from 22⁺⁰ weeks gestation or from infants weighing ≥ 500 g. A total of 92,403 births took place during the study period, 37,456 by primiparous women and 54,947 by multiparous women.

3.1.2 Study measures

Data on maternal characteristics, pregnancy complications and birth characteristics were obtained from the IMBR. Obstetric interventions and birth complications were registered using the following: 1) the recorded variables and diagnostic and surgical codes in the IMBR, 2) the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10) and 3) the Nordic Medico-Statistical Committee Classification of Surgical Procedures (NCSP).⁹⁸

3.1.2.1 Exposure variable

The exposure variable was both a binominal variable and a trichotomous categorical variable based on registered citizenship. The binominal variable 'migrant women' was defined as women with citizenship other than Icelandic, including refugees and asylum seekers. Migrant women who had received Icelandic citizenship were included in the reference group. Migrant women were further categorised into a trichotomous categorical variable based on the women's country of citizenship HDI score, a statistic composite index of life expectancy at birth, education and per capita income indicators.⁸² Due to data protection regulations in Iceland, we were not able to use the variable country of citizenship. Therefore, HDI scores for year 2018 were categorised by IMBR into 12 groups at intervals of 0.050. Due to the small number of migrants coming from countries with a low HDI score, the groups in the lower levels were combined. The ten lowest categories, including countries such as the Philippines and Pakistan, were merged into one group with an HDI score of ≤ 0.849 . The second group (HDI score = 0.850-0.899) included countries like Poland and Lithuania, and the third group (HDI score ≥ 0.900) included the Nordic countries and the United Kingdom, which are the countries with health, education and economy levels similar to those of Iceland. A total of 350 women (4.3% of all migrant women) were missing from the HDI classification due to missing data on citizenship. However, the data included information stating that they did not have Icelandic citizenship, and therefore, they were included in the 'all migrant women' group and analysed separately (Appendix B and C).

3.1.2.2 Background variables

The following maternal sociodemographic characteristics at the time of childbirth were obtained from the IMBR: citizenship (Icelandic, other and the three HDI groups), age (continuous; ≤ 19 , 20-24, 25-29, 30-34, 35-39 and ≥ 40 years), parity (dichotomous; 0, 1, 2 and ≥ 3), gestational age in full weeks based on routine foetal ultrasound examination in pregnancy weeks 19-21 (continuous; $\leq 36^{+6}$ weeks (w), 37^{+0} w- 41^{+6} w and $\geq 42^{+0}$ w), marital status (married/cohabiting, single/widowed/divorced), residence (capital area (including the capital and six surrounding municipalities), rural), employment during pregnancy (employed, student, homemaker/on disability pension/unemployed), previous CS (ICD-10: O34.2) and year of giving birth (continuous; 1997-2006, 2007-2018). The cut-off year was chosen as 2007 because before that year, migrants made up

less than 2% of the population, and their numbers substantially increased after that.⁸¹ Information was also obtained on the number of antenatal care visits (continuous; 0, 1-3, 4-8, 9-11 and ≥ 12) and level of birth services (primary [small labour units with midwives and general practitioners, homebirths or birth centres with midwives], secondary [medium-sized labour units with midwives, obstetricians or surgeons with obstetrical training] and tertiary [specialised maternity units with facilities for high-risk pregnancy and labour, with midwives, obstetricians, anaesthesiologists, neonatologists and neonatal nurses; surgical service; and a neonatal intensive care unit- NICU]) healthcare settings. Additionally, data on maternal diagnosis of chronic and pregnancy-related diabetes (ICD-10: O24.0-1, O24.4, O24.9, E10-14), hypertensive disorders (ICD-10: O10-11, O13-14, O15.0-1, O16, I10), HIV (ICD-10: Z21, B20.8), hepatitis (ICD-10: Z22.5, B18.1-2), thalassemia (ICD-10: D56), symphysis pubis dysfunction (ICD-10: O26.7) and obesity (ICD-10: E66.0-2, E66.8-9) during pregnancy and birth were obtained. Missing variables are presented in Tables 2 and 3.

3.1.2.3 Outcome variables

Childbirth interventions included induction of labour (IMBR: onset of labour; ICD-10: O83.8; NCSP: MASC00, MAXC02 and MAXC09), augmentation of spontaneous labour with oxytocin (NCSP: MAXC00) and amniotomy (NCSP: MASC05), epidural during labour (NCSP: WAA307, ZXXX30), perineal support (IMBR: yes, no), episiotomy (NCSP: MAXX00), instrumental vaginal birth (ICD-10: O81.0-5), elective CS (IMBR: onset of labour; ICD-10: O82.0) and emergency CS (ICD-10: O82.1). Maternal outcomes included obstetric anal sphincter injury (OASI) (ICD-10: O70.2-3) and postpartum haemorrhage (ICD-10: O72.0-3). Neonatal outcomes included preterm birth ($\leq 36^{+6}$ w) (IMBR: continuous), a five-minute Apgar score < 7 (IMBR: continuous), NICU admission (IMBR: supervision of new-born) and perinatal mortality (IMBR: death of the new-born), which was defined as the intrauterine death of a foetus with a gestational age of ≥ 22 weeks, and/or weight of ≥ 500 gr if gestational age is unknown and the death of a new-born in the first week after birth.

3.1.3 Study analysis

All variables were analysed as categorial variables. Chi-square and Fisher's exact tests were used to compare crude rates. Fisher's exact test was used if $>20\%$ of the cells had an expected count less than 5 (identified in Table 2 and 3). We used logistic regression models with listwise deletion of missing data, to calculate odds ratios (ORs) and 95% confidence intervals (CI) for the differences in maternal and perinatal outcomes between migrant and Icelandic women, using women with Icelandic citizenship as the reference group. Separate calculations were made for all women with foreign citizenship and for each of the three HDI groups. The models were adjusted for the continuous variables: maternal and gestational age at the time of giving birth, number of antenatal care visits and birth year. The models were also adjusted for the binominal variables: hypertensive

disorder, diabetes, HIV, hepatitis, obesity, symphysis pubis dysfunction, thalassemia, marital status, residency, and employment status; and the trichotomous variable level of birth services. All analyses were stratified by parity, and the model for multiparous women was additionally adjusted for the continuous variable previous births and the binominal variable previous CS.

All analyses were conducted using statistical software SPSS (version 26).

3.2 Study II. The use of pain management in childbirth among migrant women in Iceland: A population-based cohort study

Study II was a population-based cohort study exploring the use of pain management during childbirth among migrant women in Iceland.

3.2.1 Sample and data collection

The population in this cohort study included all women who gave birth to a singleton in Iceland between 1 January 2007 and 31 December 2018. Due to missing variables on non-pharmacological pain management methods before 2007, we decided to limit the dataset to include data from 1997, which was used in Study I and has been described in detail, to the year 2007. A total of 51,791 singleton births took place during the study period. We excluded all the elective CS that took place within the study period ($n=3,618$); finally, 48,173 births were used in this study.

3.2.2 Study measures

Data on migration status, maternal characteristics, birth characteristics, and pain management methods were obtained from the IMBR. Obstetric interventions, pain management methods and birth complications were registered using: 1) the recorded variables, diagnostic and surgical codes in the IMBR; 2) ICD-10; 3) the Nursing Interventions Classification (NIC); 4) the Anatomical Therapeutic Chemical (ATC) Classification; and 5) NCSP, according to the recommendation of the Nordic Medico-Statistical Committee.⁹⁸ The ascertainment for all pain management methods is presented in Table S4.

3.2.2.1 Exposure variable

The exposure variable was the same as in Study I and has been described in detail above. The HDI classification of 211 women (3.5% of all migrant women) was unavailable due to missing data on citizenship, but they were included in the 'all-migrant women' group and analysed separately.

3.2.2.2 Background variables

The following maternal sociodemographic characteristics at the time of childbirth were obtained: age (continuous; ≤ 19 , 20-24, 25-29, 30-34, 35-39 and ≥ 40 years), parity (0, 1, 2 and ≥ 3), marital status (married/cohabiting, single/widowed/divorced), residence (capital area [including the capital and six surrounding municipalities], rural), number of antenatal care visits (continuous; 0, 1-3, 4-8, 9-11 and ≥ 12) and employment during pregnancy (employed, student, homemaker/on disability/unemployed).

Information was also obtained on birth related characteristics such as induction of labour (IMBR: onset of labour; ICD-10: O83.8, NCSP: MASC00, MAXC02 and MAXC09) and augmentation of spontaneous labour with oxytocin and amniotomy (NCSP: MASC05 and MAXC00), prolonged first (ICD-10: O63.0) and second (ICD10: O63.1) stages of labour and high birthweight (IMBR: ≥ 4000 g). Information on place of childbirth, including birth in primary (small-sized labour unit with midwives and general practitioners, homebirth or birth centre with midwives), secondary (medium sized labour unit with midwives, obstetricians or surgeons with obstetrical training) and tertiary (specialised maternity unit for high-risk pregnancies and births with midwives, obstetricians, anaesthesiologists, neonatologists and neonatal nurses; surgical service; and NICU available at all times) healthcare settings were also obtained from IMBR.

Maternal comorbidity such as diagnoses of chronic or pregnancy-related hypertensive disorders (ICD-10: O10-11, O13-14, O15.0-1, O16 and I10) and diabetes (ICD-10: O24.0-1, O24.4, O24.9, E10-14) during pregnancy and birth were also included.

3.2.2.3 Outcome variables

Dichotomous outcome variables included the following non-pharmacological pain management methods, presented in Table S4: relaxation (NIC: 6040), massage (NIC: 1480), acupuncture (NCSP: AXXA00), sterile water injection (NIC: 2317), warm/cold packs (NIC: 1380), transcutaneous electrical nerve stimulation (TENS) (NIC: 1540), shower/bath (NIC: 1340) and aromatherapy (NIC: 1330). The pharmacological pain relief variables were pethidine (Meperidine) (ATC: N02AB02), nitrous oxide inhalation (NCSP: WAA740), pudendal nerve block (NCSP: WAA230) and epidural anaesthesia (NCSP: WAA307 and ZXXX30). These variables were also combined in five composite outcome variables: the use of non-pharmacological methods alone, the use of pharmacological methods alone, the use of a combination of non-pharmacological and pharmacological methods, the use of a combination of non-pharmacological methods and nitrous oxide inhalation, and the use of no pain management methods.

The registration on the use of aromatherapy was initiated in 2012; therefore, in the analyses for aromatherapy, the cohort was limited to the period between 2012 and 2018. During the study period, no woman in the cohort was registered for the use of self-

hypnosis, music, acupuncture or morphine, and only seven Icelandic women had paracervical block; therefore, they were not analysed.

3.2.3 Study analysis

Descriptive data are reported as numbers of observations and prevalence (%). Chi-square tests were used to compare crude percentages of background variables. Fisher's exact test was used if >20% of the cells had an expected count less than 5, and t-test was used when comparing variable means. We used logistic regression models, with forced entry and listwise deletion of missing data, to calculate ORs and 95% CI for the differences in the use of pain management methods between migrant and Icelandic women, using women with Icelandic citizenship as the reference group. Separate calculations were made for all women with foreign citizenship and for each of the three HDI-groups. The models were adjusted for the following variables: Continuous (maternal age at time of giving birth, parity and number of antenatal care visits), dichotomous (marital status, residency, employment status, induction of labour, augmentation of labour, prolonged first and second stage of labour, high birthweight, hypertensive disorder, and diabetes) and trichotomous (place of birth) variables.

All analyses were conducted using the statistical software SPSS (version 26).

3.3 Study III. "She's going to give me information and support that no one else can": A longitudinal qualitative study on migrant women's care needs, expectations, and experiences of midwifery care during birthing in Iceland

Study III was a longitudinal, qualitative study involving individual semi-structured interviews and reflexive thematic analysis. The aim was to explore migrant women's care needs, expectations and experiences of midwifery care during childbirth in Iceland.

3.3.1 Sample and data collection

We used a convenience sampling approach, using two different methods. First, midwives offering antenatal care introduced the study to Polish women in their third trimester. The midwives used an information sheet, which explained what participation in the study entailed. The inclusion criteria were that the participants were Polish, in their third trimester of pregnancy, over 18 years old and planned to give birth in Iceland. Second, a Polish woman known by the researcher was asked to introduce the study to Polish women in a Facebook group called 'Polish women in Iceland'. Overall, nine women accepted to participate (seven through the Facebook group and two through the midwives), and they all preferred an email with further information in Polish about the study; this way, they could ask any questions they might have before deciding whether to participate. However, one of them gave birth before the interview, and such, eight

women finally participated in the study. The time and place for the interviews were decided by the participants. Each woman was interviewed twice, once during pregnancy and once postpartum. Five interviews took place through zoom while eleven took place in person. We stopped recruitment when we felt the interviews provided enough data to meet the aims of our study.

Interviews were conducted from December 2021 to May 2022 (during the COVID-19 pandemic), by the first author, under the supervision of two researchers with experience in qualitative research methods. A female Polish translator was used during all interviews which lasted between 48 and 138 minutes, with a mean duration of 87 minutes. The flow and length of interviews conducted through zoom did not differ from that of interviews conducted in person. All the interviews were recorded and transcribed verbatim in Icelandic. Quotations from this study were translated forwards and backwards from Icelandic to English by the first author and discussed with co-authors who are fluent in both English and Icelandic. Two separate piloted interview guides, developed by the research team, were used, one for the pregnancy period and one for the postpartum period. They were piloted on three migrant women from Poland. The questions were then reviewed in relation to language, length, wording and relevance. Some questions were rephrased. The interviews were semi-structured, and the questions were used as guidance in accordance with the aim of the study. The key questions sought to explore what kind of feelings arose when the participants thought about childbirth while pregnant, what kind of birth they opted for and how they would describe ideal care in labour. In the postpartum interviews, the participants were asked to describe their experience and care needs during labour. They were also asked if there was something in the care they received, that they would have liked to be different and if they experienced comfort during birth. Participants were given the opportunity to discuss freely based on the questions asked, and the first author used probing questions to elicit further in-depth information.

3.3.2 Study analysis

Reflexive thematic analysis was used.⁹⁹ First, we transcribed the data in detail and generated initial codes, taking all data into equal consideration. Then we generated themes from the codes representing a distinctiveness and internal coherence. The themes were cross-checked against each other and grounded in the data. We came up with a few theme definitions before ending up with the one presented in this paper. We carefully sorted the relevant statements that corresponded to the themes. With the longitudinal data we collected, first, the migrant women's needs and expectations were analysed from the dataset gathered during pregnancy. Second, the migrant women's experience was analysed from the dataset gathered after birth. Third, the two datasets were analysed for each participant to gain insight into how their individual birth experiences were in accordance with their needs and expectations and if these were met.

Themes were generated to capture what was important in relation to the aim of the study.¹⁰⁰ Our goal was to provide a well-organised evidence-based analytical story, a pattern of meanings after a thoughtful reflection on how the themes were being generated from the data. ATLAS.ti Mac (Version 9.1.3 (2089)), a qualitative data analysis program was used to organise and process the themes and patterns of meaning from the interviews.

Preliminary data analysis was performed by the first author, but all authors contributed to the final analysis. The researcher who conducted the interviews was a midwife of the same gender as the participants, with good experience in clinical work. Also, two of the authors in this study are midwives and professors with a good experience in clinical and academic work, and one of them resides in the Netherlands. The fourth researcher is a senior lecturer in qualitative studies and a social psychologist; thus, all authors brought a different lens to the analysis, which benefited the study.

3.4 Ethical considerations

Ethical approval was obtained from the National Bioethics Committee on 11 June 2019 (VSNb2019050003/03.01) for all three studies.

The participation in Study III was voluntary, and prior to the interview, all participants signed an informed consent form. As an incentive and appreciation for the time taken to participate, the women were paid 5000 ISK. In general, collection of data from migrant women poses several challenges. Migrant women are a diverse group, often in a vulnerable position and may be intimidated by power differences between themselves and the researchers. They may find the topic sensitive and/or have limited time or desire to engage in research. Also, by collecting in-depth data from the same participant over time, ethical issues, such as intrusion, distortion of experience and dependency, may be amplified.¹⁰¹ Therefore, following the interviews, all participants were offered access to a midwife who did not participate in conducting this study and who specializes in providing care to vulnerable women if difficult emotions arise. This did not occur.

4 Results

The results of the three studies are presented in the corresponding papers (I-III). Here the summary of the results is presented.

4.1 Study I

The total cohort consisted of 37,456 primiparous and 54,947 multiparous women, of which 4,401 were migrant primiparous women and 3,757 were migrant multiparous women, respectively. The migrant primiparous and multiparous women were more likely to be married/cohabiting and less likely to be living in the capital area and be employed/students, compared to the Icelandic women. They had fewer antenatal care visits and lower gestational age than the Icelandic women and were less often diagnosed with hypertensive disorder and symphysis pubis dysfunction. The migrant primiparous women were older than their Icelandic counterparts and less likely to be diagnosed with obesity, and the migrant multiparous women had lower parity, were less likely to give birth in a primary birth facility and were more likely to have undergone a previous CS.

4.1.1 Childbirth interventions

The aOR for induction of labour was significantly lower for migrant primiparous women overall and for those from countries with the highest HDI score (≥ 0.900) compared with that for Icelandic primiparous women (Table 2). The aOR for induction of labour was also lower for migrant multiparous women overall and for multiparous women from countries with middle and low HDI scores (HDI < 0.900) compared with that for Icelandic multiparous women (Table 3).

The aOR for oxytocin augmentation was significantly higher for migrant primiparous women from countries with the lowest HDI score (≤ 0.849), than for Icelandic primiparous women (Table 2).

The aOR for perineum support for migrant primiparous women from countries with a middle HDI score (0.850–0.899) was lower than that for Icelandic primiparous women (Table 2). The aOR for perineum support was lower for migrant multiparous women from countries with a middle HDI score (0.850–0.899) but higher for migrant multiparous women overall as it was for migrant multiparous women from countries with the lowest HDI score (≤ 0.849) compared with that for Icelandic multiparous women (Table 3).

Table 2 Prevalence (%) of, crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for maternal and perinatal outcomes of primiparous women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (1997–2018)^a

| | Icelandic women (n=33,055) | | All migrant women (n=4,401) | | Migrant women, HDI ≥0,900 (n=893) | | Migrant women, HDI 0.850-0.899 (n=2,327) | | Migrant women, HDI ≤0.849 (n=1,004) | | | | | |
|--------------------------------------|----------------------------|---------|-----------------------------|------------------|-----------------------------------|------------------|--|------------------|-------------------------------------|------------------|------------------|------------------|------------------|------------------|
| | % | OR (CI) | % | aOR (CI) | % | OR (CI) | % | OR (CI) | % | aOR (CI) | | | | |
| CHILD BIRTH INTERVENTIONS | | | | | | | | | | | | | | |
| Induction of labour ^b | 20.9 | | 21.4 | 1.03 (0.95-1.12) | 18.4 | 0.86 (0.71-1.04) | 0.73 (0.58-0.90) | 22 | 1.07 (0.96-1.19) | 0.86 (0.75-1.00) | 22.8 | 1.12 (0.95-1.32) | 1.02 (0.84-1.25) | |
| Amniotomy ^{c,d} | 31 | | 30.5 | 0.97 (0.89-1.07) | 25.8 | 0.81 (0.64-1.03) | 0.91 (0.69-1.19) | 31.8 | 1.04 (0.92-1.17) | 1.16 (0.98-1.36) | 28.6 | 0.89 (0.73-1.09) | 1.09 (0.85-1.39) | |
| Oxytocin augmentation ^{c,d} | 33.6 | | 35.6 | 1.11 (1.02-1.22) | 29 | 0.82 (0.65-1.04) | 0.81 (0.62-1.06) | 36.2 | 1.14 (1.02-1.28) | 1.11 (0.94-1.30) | 39.5 | 1.31 (1.09-1.58) | 1.31 (1.04-1.66) | |
| Epidural ^b | 50.6 | | 50.3 | 0.99 (0.92-1.06) | 40.7 | 0.94 (0.86-1.02) | 0.67 (0.58-0.78) | 52.8 | 1.09 (1.00-1.19) | 1.00 (0.89-1.12) | 52.5 | 1.08 (0.94-1.24) | 1.10 (0.93-1.29) | |
| Perineum support ^{c,f} | 63.8 | | 64.9 | 1.06 (0.95-1.19) | 56.7 | 0.75 (0.58-0.97) | 0.78 (0.56-1.07) | 66.4 | 1.13 (0.98-1.30) | 0.79 (0.64-0.98) | 67.8 | 1.21 (0.95-1.53) | 1.15 (0.83-1.61) | |
| Episiotomy ^{d,f} | 18.3 | | 17.7 | 1.26 (1.14-1.39) | 22 | 1.31 (1.06-1.63) | 1.16 (0.90-1.47) | 21.9 | 1.30 (1.16-1.47) | 1.29 (1.10-1.52) | 19.9 | 1.16 (0.95-1.41) | 1.09 (0.86-1.39) | |
| Instrumental birth ^b | 15.1 | | 17.1 | 1.19 (1.08-1.30) | 16.8 | 1.16 (0.96-1.42) | 1.02 (0.82-1.26) | 16.6 | 1.15 (1.02-1.29) | 1.15 (0.98-1.34) | 18.2 | 1.29 (1.08-1.54) | 1.23 (1.00-1.51) | |
| Elective CS | 3.6 | | 4.2 | 1.22 (1.04-1.43) | 1.09 (0.89-1.33) | 4.9 | 1.43 (1.05-1.95) | 1.14 (0.80-1.62) | 4.1 | 1.18 (0.95-1.46) | 1.18 (0.90-1.55) | 4.1 | 1.18 (0.86-1.62) | 0.87 (0.60-1.28) |
| Emergency CS | 13.5 | | 13.6 | 1.00 (0.91-1.11) | 13.5 | 1.00 (0.81-1.24) | 0.87 (0.68-1.10) | 12.1 | 0.88 (0.77-1.01) | 0.96 (0.81-1.14) | 17.3 | 1.34 (1.11-1.60) | 1.43 (1.16-1.76) | |
| MATERNAL OUTCOMES | | | | | | | | | | | | | | |
| OASIS ^g | 8.9 | | 9.1 | 0.81 (0.71-0.92) | 8.8 | 0.97 (0.75-1.26) | 0.88 (0.67-1.17) | 6 | 0.64 (0.53-0.77) | 0.70 (0.55-0.89) | 10.7 | 1.20 (0.96-1.51) | 1.33 (1.02-1.72) | |
| Postpartum hemorrhage | 7.0 | | 6.8 | 0.85 (0.71-1.03) | 7.6 | 1.13 (0.88-1.46) | 1.05 (0.79-1.38) | 8.6 | 1.30 (1.12-1.51) | 0.90 (0.74-1.09) | 9.2 | 1.39 (1.12-1.73) | 1.14 (0.88-1.47) | |
| NEONATAL OUTCOMES | | | | | | | | | | | | | | |
| Preterm | 5.5 | | 6.2 | 1.14 (0.99-1.30) | 5.2 | 0.94 (0.69-1.28) | 0.44 (0.29-0.67) | 6 | 1.10 (0.92-1.32) | 0.75 (0.58-0.97) | 7 | 1.30 (1.01-1.67) | 0.44 (0.32-0.62) | |
| Five min Apgar <7 ^h | 3.1 | | 3.2 | 0.77 (0.63-0.93) | 2.2 | 0.69 (0.44-1.08) | 0.67 (0.40-1.11) | 2.5 | 0.78 (0.60-1.02) | 1.01 (0.73-1.39) | 2.6 | 0.80 (0.54-1.19) | 0.86 (0.55-1.35) | |
| NICU admission ^{d,g} | 9 | | 9 | 1.00 (0.86-1.17) | 1.08 (0.87-1.35) | 9.3 | 1.03 (0.72-1.49) | 1.34 (0.89-2.02) | 8.5 | 0.94 (0.77-1.14) | 1.03 (0.77-1.37) | 10.5 | 1.18 (0.87-1.58) | 1.07 (0.72-1.58) |
| Perinatal mortality ^h | 0.5 | | 0.6 | 1.26 (0.82-1.93) | 0.81 (0.41-1.61) | 0.3 | 0.74 (0.24-2.34) | 0.29 (0.04-2.30) | 0.5 | 1.15 (0.64-2.06) | 0.71 (0.25-2.05) | 1 | 2.22 (1.17-4.23) | 1.80 (0.68-4.77) |

Abbreviations: HDI, Human Development Index; OR, Odds ratio; CI, Confidence interval; aOR, Adjusted odds ratio; OASIS, Obstetric Anal Sphincter Injury; NICU, Neonatal Intensive Care Unit; CS, Cesarean Section

Statistically significant findings for crude and adjusted ORs are marked in bold

^aDenominators vary because of missing values and exclusion criteria (listed in Supporting Information Table S1)

^bAmong women with planned vaginal birth (women excluded if they had an elective cesarean section)

^cAmong women with spontaneous onset of labour (women excluded if they had an elective cesarean section and an induction of labour)

^dRegistration begun year 2006, total numbers 22,873 (Icelandic women: 19,206; all migrant women: 3,665; highest HDI: 590; middle HDI: 2,137; lowest HDI: 825)

^eRegistration begun year 2012, total numbers 11,853 (Icelandic women: 9,953; all migrant women: 1,910; highest HDI: 295; middle: 1,155; lowest HDI: 410)

^fAmong live births (newborn excluded if stillborn)

^gChi-square tests was not valid due to >20% cells have expected count less than 5, Fisher exact test was used

^hAdjustments were made for age, gestation age (except for the variable preterm), number of antenatal visits, occupation, birthyear, residence, marital status, level of birth services, hypertensive disorder, diabetes, HIV, hepatitis, obesity, thalassaemia and symphysis pubis dysfunction

The aOR for episiotomy was higher for migrant primiparous women overall and for migrant primiparous women from countries with a middle HDI score (0.850–0.899) than for Icelandic primiparous women (Table 2). The aOR for episiotomy was also higher for migrant multiparous women overall and for migrant multiparous women from countries with a middle HDI score (0.850–0.899) than for Icelandic multiparous women (Table 3).

The aOR for instrumental birth was higher for migrant primiparous women overall than for Icelandic primiparous women (Table 2). The aOR for instrumental birth was also higher for migrant multiparous women overall and for migrant multiparous women from countries with middle and low HDI scores (<0.900) (Table 3).

The difference in the prevalence of and crude ORs for elective CS between the groups did not reach statistical significance. However, the aOR for elective CS reached statistical difference for migrant multiparous women overall and for those from countries with high, middle and low HDI scores compared with Icelandic multiparous women (Table 3).

The aOR for emergency CS were higher for migrant primiparous women from countries with the lowest HDI score (≤ 0.849), than for Icelandic primiparous women (Table 2). The aOR for emergency CS was also higher for migrant multiparous women overall, as well as for migrant multiparous women from countries with middle and low HDI scores (<0.900), than for Icelandic multiparous women (Table 3).

4.1.2 Maternal outcomes

The aOR for OASI were lower for migrant primiparous women from countries with a middle HDI score (0.850-0.899) but higher for migrant primiparous women from countries with the lowest HDI score (≤ 0.849), than for Icelandic primiparous women (Table 2). The aOR for OASI were also higher for migrant multiparous women from countries with the lowest HDI score, than for Icelandic multiparous women (Table 3).

The crude ORs for postpartum haemorrhage were significantly higher for migrant women overall and for those from countries with middle (0.850–0.899) and the lowest (≤ 0.849) HDI scores than for Icelandic primiparous women; however, after adjusting for covariates, the aOR for postpartum haemorrhage among them did not remain significant (Table 2). In contrast, the aOR for postpartum haemorrhage among migrant multiparous women from countries with the lowest HDI score (≤ 0.849) relative to that for postpartum haemorrhage among Icelandic multiparous women stayed significant after adjustments were made for covariates (Table 3).

Table 3 Prevalence (%) of, and crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for maternal and perinatal outcome of multiparous women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (1997–2018)^a

| | Icelandic women (n=51,190) | | All migrant women (n=51,757) | | Migrant women, HDI ≥0.900 (n=954) | | | Migrant women, HDI 0.850-0.899 (n=1,748) | | | Migrant women, HDI ≤0.849 (n=882) | | |
|--------------------------------------|-------------------------------|---------|---------------------------------|-------------------------|--------------------------------------|-------------------------|-------------------------|---|-------------------------|-------------------------|--------------------------------------|-------------------------|-------------------------|
| | % | OR (CI) | aOR (CI) | % | OR (CI) | aOR (CI) | % | OR (CI) | aOR (CI) | % | OR (CI) | aOR (CI) | |
| CHILD BIRTH INTERVENTIONS | | | | | | | | | | | | | |
| Induction of labour ^b | 18.2 | 15.9 | 0.85 (0.77-0.94) | 0.74 (0.66-0.83) | 14.5 | 0.77 (0.63-0.94) | 0.82 (0.66-1.02) | 16.5 | 0.89 (0.76-1.02) | 0.71 (0.61-0.83) | 16.2 | 0.87 (0.71-1.07) | 0.69 (0.55-0.87) |
| Anniotomy ^{c,d} | 23.3 | 22.3 | 0.94 (0.84-1.04) | 1.05 (0.93-1.18) | 23.1 | 0.98 (0.78-1.24) | 1.10 (0.86-1.40) | 21.6 | 0.90 (0.78-1.04) | 0.99 (0.85-1.16) | 22.4 | 0.94 (0.76-1.17) | 1.11 (0.88-1.41) |
| Oxytocin augmentation ^{e,d} | 12.9 | 14 | 1.11 (0.97-1.26) | 1.14 (0.99-1.32) | 14.4 | 1.14 (0.86-1.52) | 1.03 (0.79-1.48) | 13.9 | 1.10 (0.93-1.40) | 1.16 (0.96-1.41) | 13.1 | 1.03 (0.79-1.34) | 1.05 (0.78-1.41) |
| Epidural ^b | 25.4 | 25.3 | 1.12 (1.03-1.21) | 0.91 (0.83-1.00) | 23.1 | 0.89 (0.75-1.05) | 0.88 (0.73-1.06) | 30.2 | 1.28 (1.15-1.43) | 0.98 (0.86-1.11) | 26.8 | 1.08 (0.92-1.28) | 0.78 (0.64-0.95) |
| Perineum support ^{e,f} | 56.9 | 61.6 | 1.24 (1.12-1.38) | 1.39 (1.21-1.60) | 50.6 | 0.79 (0.62-1.01) | 0.97 (0.72-1.32) | 59.6 | 1.14 (1.00-1.31) | 0.73 (0.61-0.87) | 74 | 2.20 (1.73-2.81) | 1.95 (1.43-2.66) |
| Epistiotomy ^{g,h} | 3.9 | 3.7 | 1.41 (1.18-1.70) | 1.29 (1.05-1.59) | 5.3 | 1.45 (1.00-2.14) | 1.16 (0.76-1.77) | 5.4 | 1.47 (1.15-1.87) | 1.35 (1.03-1.76) | 5.4 | 1.49 (1.04-2.12) | 1.45 (0.99-2.17) |
| Instrumental birth ^b | 3.3 | 4.5 | 1.45 (1.22-1.73) | 1.41 (1.16-1.72) | 4.6 | 1.46 (1.04-2.05) | 1.30 (0.90-1.88) | 4.7 | 1.51 (1.19-1.93) | 1.48 (1.14-1.94) | 4.8 | 1.54 (1.09-2.18) | 1.53 (1.05-2.23) |
| Elective CS | 8.8 | 8.2 | 0.91 (0.81-1.03) | 0.67 (0.57-0.78) | 7.9 | 0.88 (0.69-1.11) | 0.69 (0.51-0.92) | 7.8 | 0.87 (0.73-1.04) | 0.68 (0.55-0.84) | 9.5 | 1.08 (0.86-1.35) | 0.60 (0.45-0.81) |
| Emergency CS | 6.4 | 8.3 | 1.36 (1.19-1.56) | 1.32 (1.12-1.55) | 7 | 1.13 (0.85-1.49) | 1.05 (0.76-1.44) | 7.9 | 1.30 (1.07-1.57) | 1.31 (1.04-1.64) | 11.1 | 1.89 (1.49-2.40) | 1.67 (1.25-2.24) |
| MATERNAL OUTCOMES | | | | | | | | | | | | | |
| OAS1 ^f | 2.4 | 2.5 | 1.07 (0.85-1.34) | 0.92 (0.70-1.20) | 2 | 0.83 (0.51-1.37) | 0.61 (0.34-1.08) | 2.2 | 0.92 (0.64-1.31) | 0.83 (0.56-1.23) | 4.1 | 1.78 (1.22-2.60) | 1.55 (1.00-2.40) |
| Postpartum hemorrhage | 4.7 | 6.3 | 1.41 (1.23-1.62) | 1.09 (0.94-1.27) | 4.4 | 0.97 (0.71-1.32) | 0.94 (0.68-1.32) | 6.3 | 1.41 (1.16-1.72) | 0.97 (0.79-1.19) | 7.9 | 1.81 (1.42-2.32) | 1.41 (1.07-1.85) |
| NEONATAL OUTCOMES | | | | | | | | | | | | | |
| Preterm | 3.8 | 3.7 | 4.9 | 1.36 (1.16-1.59) | 4.2 | 1.15 (0.83-1.59) | 0.82 (0.57-1.19) | 4.9 | 1.36 (1.08-1.70) | 1.19 (0.92-1.53) | 5.7 | 1.58 (1.18-2.12) | 1.11 (0.79-1.56) |
| Five min Apgar <7 ^g | 1.7 | 1.7 | 1.2 | 0.70 (0.52-0.94) | 1.1 | 0.61 (0.33-1.14) | 0.64 (0.33-1.24) | 1.3 | 0.73 (0.48-1.12) | 0.82 (0.52-1.31) | 1 | 0.59 (0.31-1.15) | 0.69 (0.31-1.36) |
| NICU admission ^{e,h} | 4.5 | 4.5 | 1.02 (0.82-1.26) | 0.90 (0.70-1.16) | 3.5 | 0.77 (0.45-1.32) | 0.87 (0.49-1.53) | 4.3 | 0.95 (0.71-1.27) | 0.85 (0.60-1.21) | 6.2 | 1.40 (0.96-2.04) | 1.05 (0.69-1.62) |
| Perinatal mortality ^h | 0.4 | 0.4 | 1.03 (0.60-1.77) | 1.05 (0.54-2.04) | 0.5 | 1.45 (0.59-3.52) | 1.54 (0.55-4.34) | 0.2 | 0.63 (0.23-1.70) | 0.47 (0.13-1.73) | 0.5 | 1.25 (0.46-3.37) | 1.05 (0.53-1.64) |

Abbreviations: HDI: Human Development Index; OR: Odds Ratio; CI: Confidence Interval; aOR: Adjusted Odds Ratio; OAS1: Obstetric Anal Sphincter Injury; NICU: Neonatal Intensive Care Unit; CS: Caesarean Section.
^aStatistically significant findings by crude and adjusted ORs are in bold in bold.
^bDenominator's vary because of missing as well as exclusion criteria (based on S. reporting information table 5).
^cAnt's 5 women with perineal signs of ant. (we then excluded if they had an elective cesarean section).
^dAmong women with perineal signs of labor (women excluded if they had an elective cesarean section and an indicator of labor).
^eRegistration before year 2006, low numbers 33,167 (Icelandic women: 30,034, a migrant women: 3,133; highest HDI: 0.98, middle HDI: 1.656, over HDI: 7.81).
^fRegistration before year 2012, total numbers 16,828 (Icelandic women: 14,852, a migrant women: 1,976; high HDI: 30.4, middle HDI: 1.105, over HDI: 4.16).
^gAnt's 5 live births (newborn excluded if still born).
^hIf CI square was less than 0.05, we did not calculate >20% cells have expected count less than 5. Fisher exact test was used.
ⁱAll outcomes were made by: age, parity, gestation, age (except for the aetiology), number of previous cesarean, level of previous cesarean, level of previous cesarean, section.

4.1.3 Neonatal outcomes

The crude ORs for preterm births were significantly higher and the aORs for preterm births lower for migrant primiparous women from countries with the lowest HDI score (≤ 0.849) than for Icelandic primiparous women (Table 2). The aORs for preterm birth were also lower for migrant primiparous women from countries with middle and high HDI scores than for Icelandic primiparous women (Table 2). The crude OR for preterm birth was higher for migrant multiparous women overall and for those from countries with middle (HDI 0.850–0.899) and low (HDI ≤ 0.849) HDI scores than for Icelandic multiparous women (Table 3). After adjustments, the aORs for preterm births were not significant (Table 3).

The crude ORs for perinatal mortality were significantly higher for migrant primiparous women from countries with the lowest HDI score (≤ 0.849), than for Icelandic primiparous women, but the results were not significant after adjustments were made (Table 2).

4.2 Study II

Among all 48,173 births included in this study, 42,076 (87.3%) were Icelandic and 6,097 (12.7%) were migrant. Compared to Icelandic women, migrant women were more likely to be younger, married/cohabiting, have lower parity, have labour augmentation and prolonged first and second stages of labour. Overall, migrant women were less likely to be diagnosed with hypertensive disorders, have their labour induced, give birth to an infant with macrosomia, be employed/a student and live in the capital area, compared to Icelandic women. No differences were observed in terms of place of birth for migrant women overall. Table 4 presents the crude and adjusted ORs with 95% CIs for the use of pain management methods among migrant women in HDI groups, compared to Icelandic women.

4.2.1 The use of any pain management methods

The main results of the multivariate logistic regression analyses were that more migrant women did not use any form of pain relief compared to Icelandic women (Table 4), and that migrant women from countries with the highest (≥ 0.900) and lowest (≤ 0.849) HDI scores had higher aORs for the use of no pain management method compared to Icelandic women.

When adjusted for covariates, no differences were observed in the ORs of use of any pain management method among women with missing data on citizenship when compared to women with Icelandic citizenship (Table 4).

4.2.2 The use of non-pharmacological pain management methods

We observed significantly lower aORs for the use of non-pharmacological methods such as acupuncture, TENS, shower/bath and aromatherapy among migrant women compared to Icelandic women. The aOR for the use of warm/cold packs was higher among migrant women (Table 4). Migrant women from countries with a middle HDI score (0.850-0.899) had lower aORs for the use of acupuncture, shower/bath, aromatherapy, and non-pharmacological methods alone, but higher aORs for the use of warm/cold packs compared to Icelandic women (Table 4). Migrant women from countries with the lowest HDI score (≤ 0.849) had lower aORs for the use of acupuncture and shower/bath compared to Icelandic women (Table 4).

4.2.3 The use of pharmacological pain management methods

Migrant women overall had lower aORs for the use of nitrous oxide inhalation and a combination of non-pharmacological and pharmacological pain management methods compared to Icelandic women (Table 4). Migrant women from countries with high HDI scores (≥ 0.900) had lower aORs for the use of epidural compared with Icelandic women and migrant women from countries with the lowest HDI score (≤ 0.849) had lower aORs for the use of nitrous oxide inhalation, compared to Icelandic women. They also had lower aORs for the use of a combination of non-pharmacological and pharmacological methods, and a combination of non-pharmacological methods and nitrous oxide inhalation compared to Icelandic women (Table 4).

Table 4 The crude odds ratios (ORs) and adjusted ORs (aORs) with 95% confidence intervals (CIs) for the use of non-pharmacological and pharmacological pain management methods by birthing women with foreign citizenship compared to women with Icelandic citizenship who gave birth to a singleton in Iceland during the study period (2007-2018).

| | All migrant women (n=6,097) | | Migrant women, HDI ≥ 0.900 (n=1,028) | | Migrant women, HDI 0.850-0.899 (n=3,482) | | Migrant women, HDI ≤ 0.849 (n=1,376) | |
|--|--------------------------------|-------------------------|---|-------------------------|---|-------------------------|---|-------------------------|
| | OR (CI) | aOR* (CI) | OR (CI) | aOR* (CI) | OR (CI) | aOR* (CI) | OR (CI) | aOR* (CI) |
| NON-PHARMACOLOGICAL METHODS | | | | | | | | |
| Relaxation | 1.21 (0.95-1.54) | 1.32 (0.36-1.86) | 0.88 (0.47-1.66) | 1.30 (0.63-2.65) | 1.26 (0.93-1.70) | 1.40 (0.92-2.14) | 1.46 (0.95-2.45) | 1.17 (0.60-2.29) |
| Massage | 0.96 (0.84-1.09) | 1.02 (0.86-1.21) | 1.04 (0.77-1.39) | 1.14 (0.80-1.62) | 0.93 (0.79-1.11) | 1.05 (0.84-1.31) | 0.97 (0.74-1.26) | 0.87 (0.62-1.23) |
| Acupuncture | 0.74 (0.67-0.81) | 0.73 (0.64-0.83) | 0.94 (0.77-1.14) | 0.99 (0.77-1.26) | 0.68 (0.60-0.77) | 0.65 (0.55-0.78) | 0.74 (0.61-0.89) | 0.70 (0.54-0.90) |
| Sterile water injection | 1.13 (0.85-1.49) | 1.03 (0.70-1.52) | 1.29 (0.71-2.36) | 1.48 (0.75-2.93) | 1.25 (0.88-1.76) | 1.00 (0.61-1.66) | 0.79 (0.40-1.77) | 0.80 (0.36-1.77) |
| Warm/cold packs | 1.23 (1.13-1.34) | 1.21 (1.07-1.36) | 1.08 (0.88-1.31) | 1.09 (0.84-1.42) | 1.24 (1.12-1.38) | 1.31 (1.12-1.52) | 1.32 (1.12-1.55) | 1.08 (0.86-1.36) |
| TENS | 0.14 (0.04-0.58) | 0.92 (0.01-0.67) | 0.43 (0.06-3.06) | - | 0.13 (0.02-0.90) | 0.18 (0.03-1.31) | - | - |
| Shower/ Bath | 0.76 (0.70-0.83) | 0.73 (0.66-0.82) | 1.00 (0.85-1.19) | 1.10 (0.88-1.36) | 0.77 (0.69-0.85) | 0.74 (0.65-0.86) | 0.61 (0.51-0.73) | 0.51 (0.40-0.64) |
| Aromatherapy ^b | 0.60 (0.48-0.74) | 0.59 (0.44-0.78) | 1.15 (0.78-1.69) | 1.16 (0.72-1.88) | 0.45 (0.33-0.62) | 0.40 (0.26-0.61) | 0.62 (0.40-0.96) | 0.65 (0.38-1.10) |
| PHARMACOLOGICAL METHODS | | | | | | | | |
| Petidine | 1.24 (1.02-1.53) | 1.17 (0.87-1.56) | 0.86 (0.49-1.49) | 0.65 (0.30-1.40) | 1.34 (1.04-1.72) | 1.21 (0.84-1.74) | 1.24 (0.83-1.86) | 1.69 (0.99-2.89) |
| Nitrous oxide inhalation | 0.93 (0.88-0.98) | 0.89 (0.83-0.96) | 0.98 (0.87-1.11) | 1.00 (0.86-1.17) | 0.99 (0.92-1.06) | 0.94 (0.85-1.03) | 0.81 (0.73-0.90) | 0.74 (0.63-0.86) |
| Pudendal block | 1.07 (0.69-1.65) | 0.84 (0.47-1.50) | 0.82 (0.26-2.59) | 0.60 (0.15-2.47) | 1.13 (0.66-1.97) | 1.19 (0.61-2.29) | 1.23 (0.54-2.79) | 0.43 (0.1-1.81) |
| Epidural anaesthesia | 1.05 (0.98-1.13) | 0.96 (0.87-1.04) | 0.75 (0.66-0.86) | 0.64 (0.53-0.78) | 1.18 (1.10-1.26) | 1.11 (0.99-1.24) | 1.09 (0.98-1.21) | 0.91 (0.77-1.08) |
| COMBINATION VARIABLES | | | | | | | | |
| Only non-pharmacological methods used | 0.85 (0.76-0.95) | 0.89 (0.77-1.02) | 1.14 (0.91-1.42) | 1.12 (0.85-1.47) | 0.77 (0.67-0.90) | 0.82 (0.68-0.99) | 0.85 (0.68-1.06) | 0.88 (0.68-1.16) |
| Only pharmacological methods used | 1.07 (1.01-1.12) | 0.98 (0.90-1.06) | 0.88 (0.78-1.00) | 0.86 (0.73-1.01) | 1.51 (1.08-1.23) | 1.03 (0.93-1.13) | 1.01 (0.91-1.12) | 0.95 (0.82-1.10) |
| A combination of non-pharmacological and pharmacological methods used | 0.90 (0.84-0.96) | 0.87 (0.79-0.95) | 0.86 (0.73-1.00) | 0.88 (0.72-1.08) | 0.93 (0.85-1.01) | 0.94 (0.83-1.07) | 0.89 (0.78-1.01) | 0.72 (0.60-0.87) |
| A combination of non-pharmacological methods and nitrous oxide inhalation used | 0.91 (0.83-1.00) | 0.93 (0.82-1.05) | 1.01 (0.83-1.24) | 1.10 (0.86-1.41) | 0.94 (0.83-1.05) | 0.98 (0.84-1.15) | 0.81 (0.67-0.98) | 0.72 (0.55-0.92) |
| NO PAIN MANAGEMENT METHODS USED | 1.07 (1.01-1.14) | 1.23 (1.12-1.34) | 1.27 (1.11-1.45) | 1.27 (1.06-1.52) | 0.97 (0.89-1.05) | 1.10 (0.99-1.23) | 1.16 (1.03-1.30) | 1.52 (1.29-1.79) |

Denominators vary because of missing values and exclusion criteria

* Adjustments were made for maternal age at time of giving birth, parity, marital status, residency, number of antenatal care visits, employment status, induction of labour, prolonged first and second stage of labour, high birthweight, place of birth, hypertensive disorder and diabetes.

^b First registered 2012. Cohort limited during the period 2012-2018. Total n =26,983, Icelandic n =3,538, migrant women HDI ≥0.900 n =560, HDI 0.850-0.899 n =2,116, HDI ≤0.849 n =766.

4.3 Study III

All eight participants in this qualitative study were Polish women who had lived in Iceland for a duration of 1 to 5 years and whose ages range from 24 to 35 years. Five of them were married and three were in a relationship, all with Polish partners. They all lived in the capital area, and all but one were students or employed.

We generated one theme from the interviews conducted during pregnancy: (1) Feeling not understood, alone and scared. Two themes were generated from the interviews conducted after birth: (1) having someone who guides and accompanies you through pregnancy and birth; and (2) the importance of having a voice. Two themes were generated in the longitudinal analysis of the interviews taken during pregnancy and after birth: (1) Respectful individualized care; and (2) importance of sharing information and getting answers to your questions (Figure 2).

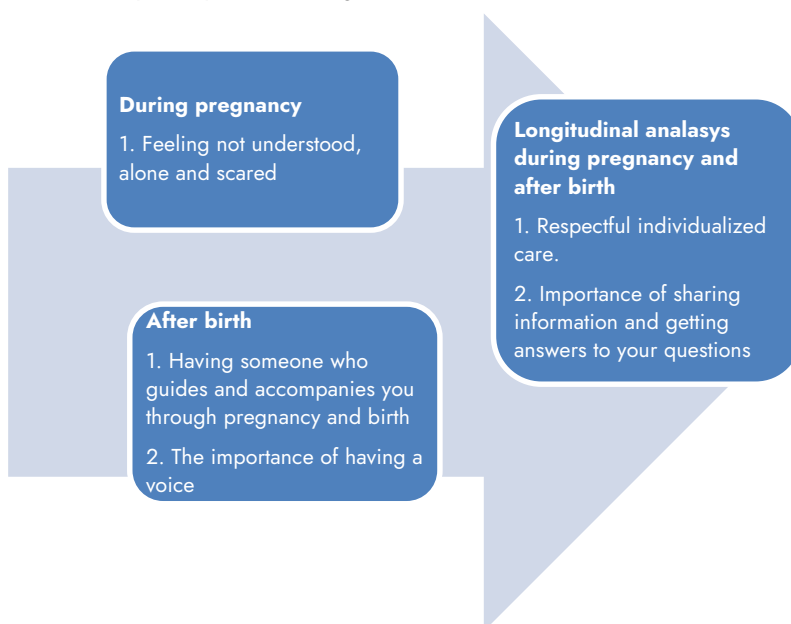


Figure 2 Themes

4.3.1 Interviews during pregnancy

4.3.1.1 Theme 1- *Feeling not understood, alone and scared*

When asked about their feelings when they thought of the birth, most women mentioned that they felt insecure and linked this to the uncertainty of how the birthing process would go. They expressed uncertainty about the experience of pain in labour but also about the labour process and communication with the midwife.

The women thought good communication was a vital part of their intrapartum care. They considered it to be the antidote to the insecurity they felt. They wanted clear

communication and to avoid misunderstandings. For them, communication was not merely transmitting information but also imparting ideas and emotions. The women expressed a strong desire for respectful, sensitive, kind and supportive care.

Some of the women were planning to use their partners as translators but were insecure and talked about how it will be stressful for their partners to translate and show them support at the same time. Some didn't know their rights regarding translators during labour, and others were planning on asking for a translator if communication become difficult. They were all hoping for a midwife who would be kind and helpful. However, some feared that the presence of their partner would inhibit their connection with the midwife. They believed that if they are alone during labour, without their partner, the midwife would give them more support and stay with them during labour. They based this on their earlier experiences in Poland and on stories from women who had given birth in Poland.

Being informed was a very important part of communication with the midwife and her care, and informed decision-making is noticeably important in the women's narratives.

The need for information was also important in relation to their uncertainty about the labour process. Power differences and hierarchy were reflected in their descriptions of how someone might do something to them or their body without informing them and getting their consent and will. The feeling of not being taken seriously and anxiety about having their needs disregarded at a vulnerable moment was apparent. In the interviews, communication in which midwives offer directions was mentioned as an important part of support in labour and seen as a way to deal with the insecurity that can accompany birth.

4.3.2 Interviews after birth

4.3.2.1 Theme 1 – Having someone who guides and accompanies you through pregnancy and birth

Most of the women chose to have their partner with them during labour. They all appreciated their partner's presence and indicated that they felt emotionally and physically supported by them. To be cared for by a good midwife was frequently mentioned when asked what makes a good midwifery care during labour. The frequently mentioned characteristics of a good midwife were kindness, warmth, friendliness and calmness. When asked what affected their feeling of comfort during labour, the women mentioned care from the midwife as a strong factor.

4.3.2.2 Theme 2 - The importance of having a voice

The feeling of security was an important one, and some women felt that they formed a trusting relationship with the midwife when they were respected. It was not only important

that they were allowed to make their own decision; it was also important that they were helped to carry them out.

Communication was a very important factor in midwifery care during labour. All women wanted to communicate with their midwives, and half of them emphasised the need to be guided and offered a translator. Communication was also evident in the way of being well informed e.g. about pain management, where the individual need of the women was taken into consideration by the midwife.

Building trust was also important, and continuity of care during labour enabled this communication between the women and the midwife.

4.3.3 Longitudinal analysis

4.3.3.1 Theme 1 – *Respectful individualised care*

Descriptions of respectful individualised care was reflected in several experiences. Whenever the women's preferences were not met, they experienced disappointment regarding intrapartum midwifery care. One of the preferences that was often mentioned was pain management, as the experience of physical pain was worse than most of the women had anticipated. The women who mentioned not being offered the various options of pain relief methods during labour also experienced a hard time communicating with the midwife and were more likely to be disappointed with midwifery care. During the pregnancy interviews, they expressed the need for a translator but said they were not offered one during labour. Also, two women experienced disappointment when they were left alone in the labour room after mentioning the importance of midwifery support during labour in the pregnancy interviews.

However, overall, the women's experience of birth was better than they had anticipated, and this was not only attributed to the joy they experienced when they had their baby in their arms but also to the good midwifery care they received and how their individual needs were met.

4.3.3.2 Theme 2 – *Importance of sharing information and getting answers to your questions*

The women's expectations were usually based on their knowledge about labour pain, facilities and the process of childbirth, and culture was an underlying factor in the women's narrative. Their own previous experiences and those of others affected their expectations and often ignited anxiety and insecurity.

The women also thought the facilities and services were better than they had expected after hearing birth stories from women who gave birth in Poland. The women thought birth preparation to be beneficial but at the same time said it was hard to prepare for birth given that each process is unique. Four women attended a birth preparation course

in Polish during pregnancy and they shared that they felt a certain security before birth and had expectations regarding pain relief methods during labour. However, two of them felt that they needed more information than was provided during birth, which was probably due to difficulties in communication with the midwife and the need for a translator, who was not offered or available. Others spoke of the importance of getting their questions answered by their midwife during antenatal care, where continuity of midwifery care was an important factor in getting the information needed to prepare for birth. Having the same midwife, at least during pregnancy, was seen to establish trust, and establishing a connection with the midwife offering the care during pregnancy, where the midwife has all the information, and seeing the same midwife were factors that promoted better communication.

5 Discussion

The overall aim of the study was to create a body of knowledge that offers a deeper understanding on which childbirth practices, if at all, need to be improved within the Icelandic healthcare system and how migrant women and their new-borns' welfare and health can be ensured. Using both quantitative and qualitative research methods for the study, we were able to shed a different light on the study objectives. The three studies indicate disadvantages for most migrant women in terms of (I) maternal and perinatal outcomes and (II) the use of pain relief management during birth. The women's experiences revolved around good communication with the midwife, empathy by the midwife, ideas and message (III).

5.1 Challenges in migrant women's maternity care in a high-income country – Study I

Migrant women were more likely to be primipara. One could speculate that they preferred to move back to their home country after the birth of their first child and have their second children there. This is also likely because their average duration of stay in Iceland is short and the average age of migrant women is low.²

There was a great variety of similarities and differences in the outcomes in Study I. There is a certain disadvantage in comparing migrants with a host population because it is difficult to ascertain whether migration itself improves or worsens health.¹⁰² In our study, the effect of socio-economic status could only be partially modelled, but after adjusting for the available variables of social status and underlying health conditions of the mother, the result indicated persistent disadvantages for most groups of migrant women, suggesting that other factors (e.g. access^{35,60} to healthcare and quality of care⁴²) might also be significant.

5.1.1 Childbirth interventions

For instrumental birth, similar results were found in a Norwegian study.²⁴ However, a Finnish study²² showed different results, with similar prevalence of instrumental delivery among migrant and Finnish women. Our finding of a higher aOR for emergency CS among migrant women in our lowest HDI group is in line with those of Swedish,²⁸ Norwegian²³ and Finnish studies.²¹ Another Norwegian study⁵⁶ showed a higher risk of emergency and elective CS for all groups of migrant women except Vietnamese, which partially agrees with our result. The timing of the emergency CS could help with speculating the possible cause of these higher odds. If the odds of undergoing emergency CS are higher during the first stage of labour, the indication might have been

present during pregnancy, perhaps an underdiagnosed problem, and with better care, they probably would have undergone an elective CS.

The reasons for an instrumental birth vary from maternal exhaustion and medical indications to a prolonged second stage of labour and foetal compromise.¹⁰³ We analysed the prevalence of foetal compromise (ICD-10: O68.0-3) and found it to be higher among all primiparous migrant women, the middle HDI group and the lowest HDI group. This may partially explain the higher instrumental birth rates observed among primiparous migrant women overall but not among multiparous migrant women.

One could speculate that differences in the mode of birth may be due to foeto-pelvic disproportion,¹⁰⁴ but when measuring its prevalence in this study (ICD-10: O65.4), only migrant women in the lowest HDI group had a higher prevalence of foeto-pelvic disproportion than Icelandic women, which does not explain the higher aOR for instrumental birth and emergency CS among multiparous migrant women in the middle HDI group. BMI, problems with communication/language and other known risk factors¹⁰⁴ could explain our results, but these were not measured in our study.

Our findings on higher odds of episiotomy for migrant women overall and those in the middle HDI group were not in line with those of a Norwegian study.²⁴

5.1.2 Maternal outcomes

We performed a sub-analysis to determine whether instrumental birth explains the higher odds for episiotomy and OASI observed among migrant women and found that it did affect the outcome for migrant women in the lowest HDI group, both primi- and multiparous women, but had no effect on the odds for the other migrant groups. Our results on postpartum haemorrhage agree partially with those of two Norwegian studies,^{23,24} but not with those of a Swedish study.²⁵

5.1.3 Neonatal outcomes

No significant differences in the incidence of low Apgar, NICU and perinatal mortality were found between Icelandic and migrant women. Our results on neonatal outcomes among all migrant primiparous women possibly suggest a later start of antenatal care among migrant women. The higher crude OR for preterm birth in the all migrant groups and higher prevalence of preterm birth in the lowest HDI groups are in line with previous studies where preterm births were more common in certain groups of migrant women, such as those from Asia and Africa, in which most of the countries have a HDI below 0.850.^{21,22,44} In a recent population-based Icelandic cohort study on premature births, migrant women were likely to be diagnosed with urinary tract infections, diabetes, intrauterine growth restriction (IUGR) and premature rupture of membranes (PROM).¹⁰⁵ This is in line with previous studies where a higher prevalence of PROM was suggested to be connected to poor housing conditions.¹⁰⁶ In a special report on migrants by

Statistics Iceland, migrants were more likely to live in cramped housing conditions, and one third of them said they believed they had poor housing.² However, despite their shorter gestational age and fewer antenatal care visits compared to Icelandic women, we know neither when their first visit took place nor how long they stayed in the country.

5.2 The use of pain management in childbirth among migrant women in Iceland - Study II

The results from this nationwide study indicate less use of pain relief among migrant women in Iceland between 2007 and 2018 compared to Icelandic women. Moreover, the results suggest higher odds of no pain relief use among migrant women from countries with the highest and lowest HDI scores and lower odds of the use of non-pharmacological pain management methods, such as acupuncture and shower/bath, among migrant women from countries with a HDI score <0.900. Additionally, lower odds were observed for the use of warm/cold packs, aromatherapy, nitrous oxide inhalation and pethidine as well as a combination of non-pharmacological and pharmacological methods among migrant women from countries with the lowest HDI score. Migrant women from countries with the highest HDI score had lower odds of epidural use compared to Icelandic women. Higher odds were only observed for the use of warm/cold packs by migrant women from countries with a middle HDI score compared to Icelandic women.

These findings are open to different interpretations. On the one hand, migrant women may have a more natural approach to childbirth and higher levels of confidence and trust in their ability to manage labour pain. On the other hand, disparity in access to all options of maternity care and lack of full exposure to quality antenatal and intrapartum midwifery care may be present.^{62,65} Still, a large group of women in each category (70%–75%) used some type of pain management. Nitrous oxide inhalation was the most used (44%–46%) pain management method within all groups of women except for migrant women in the lowest HDI-group, where epidural anaesthesia had the highest prevalence (42% compared to 41% for the use of nitrous oxide inhalation). This is interesting since the standard of care is to offer pain management methods with lower risks of side effects before offering methods, such as epidural, which have known side effects. This might indicate some sort of problems in communication and information sharing between the midwife and the pregnant woman.

Comparing our results on the use of pain management methods during labour among migrant women with those of previous studies was limited due to the different study methods and group composition regarding reason for migration and country of citizenship.¹⁰⁷

5.2.1 The use of any pain management methods

In a Finnish study,²² migrant multiparous women had a slightly higher prevalence of the use of any pain relief method in comparison to Finnish women (70% vs. 68%, $p < .01$). These results are not in accordance with those of our study where primi- and multi-parous migrant women had a lower prevalence of the use of any pain relief method in comparison to Icelandic women (73.5% vs. 74.8%, $p = .035$).

5.2.2 The use of non-pharmacological pain management methods

Our finding of lower odds of the use of non-pharmacological pain management methods among migrant women overall align with that of a Swedish study⁶² and might indicate differences in cultural preferences, access and quality of care for migrant women. The overall underutilisation of pain management methods among migrant women compared to Icelandic women in our study, especially among women from countries with HDI scores < 0.900 , is a possible indication of problems with accessibility and disparity in antenatal and intrapartum midwifery care.⁷¹ Deficiencies in the midwife–woman relationship can be a barrier to quality intrapartum care, where the midwife may not be able to interpret the wishes of the migrant women, provide sufficiently individualised care and offer the options available in an objective manner. Reasons for this could include language barriers, where limiting circumstances for the use of interpreters in the birth setting could restrict the provision of equitable care.¹⁰⁸ Cultural barriers, a wide educational gap between the pregnant woman and the midwife⁷⁰ and the midwife's response to the woman's pain expression⁷⁰ can also affect equitable care. Expressions of pain are strongly influenced by cultural, emotional, motivational, social and cognitive factors.¹⁰⁹ A lack of respect for the woman and failure to understand the migrant woman can affect health beliefs among migrant women about when, where and how to seek help.¹¹⁰ Given the administrative nature of our data, these factors were not measured in our study.

5.2.3 The use of pharmacological pain management methods

Our results of lower aORs for epidural use among migrant women in the highest HDI group is similar to those of other research;^{8,61,111} however, there was no difference in epidural use among migrant women with citizenship from countries with HDI < 0.900 , which is different from the results of other studies.^{29,61,65,111} While less use of non-pharmacological pain relief in the lower HDI groups of migrant women may, to some extent, be explained by cultural and language barriers and an educational gap, less use of epidural by the highest HDI group may be explained by higher education levels and more access to evidence-based information in the women's language.

5.2.4 Access

Migrant women's ability to access the services they need, such as pain relief, when they need them depends on whether the Icelandic maternity service can reach the targeted group and provide health education and promote preventive care.¹⁵ Even though financial means may be a practical barrier to reaching the few women migrating from outside the EEA, cost of care should not be an issue for the majority of migrant women in Iceland. However, language barriers can be an issue for most of them. Only a few antenatal educational programs on pain management methods are available in different languages in Iceland. These programs are also not covered by the Icelandic health insurance. These factors—the accessibility and cost of such programs—can affect how well a woman is informed and prepared to use pain management methods during labour. Cultural mediators, which can have an important role in reducing social and cultural barriers to access,¹¹² are not easily available in Iceland.

In our previous study (I), we found an increase in the prevalence of instrumental births and episiotomy, which strengthens our interpretation that access to healthcare and the quality of care for migrant women in Iceland is not equal to that for Icelandic women. Nevertheless, further studies are needed to examine whether the effect of having a foreign citizenship on the use of pain management methods in labour is mediated by other factors such as education⁷² and cultural preferences.

The presence of pain is not necessarily connected to a negative birth experience.¹¹³ However, women need access to effective, simple and safe ways to help them cope with labour. Their involvement in well-informed decision making and respectful support from midwives may be more important to them than pain relief itself.¹¹⁴ The lower odds of use of pharmacological pain relief methods observed among migrant women could be interpreted as a positive result due to the relationship of these methods with known side effects and other interventions. If the odds of the use of non-pharmacological pain relief methods among migrant women had been higher, we would have assumed that their need for pain relief was met in some way. However, because of the lower odds of use of non-pharmacological pain relief methods among them, it indicates poorer access and quality of care.

5.3 Migrant women's care needs, expectations, and experiences of midwifery care during birthing in Iceland - Study III

Throughout this study, the overriding finding was that many women felt insecure about care in labour, pain relief and communication. These contributed greatly to their experience of birth. The women's expectation about intrapartum care was mainly built on insecurity not only concerning the labour process and level of pain to be experienced but also concerning communication with the midwife, which was a frequent concept

during the analysis. Their expectations were largely shaped during pregnancy by other women's experience in Poland.

5.3.1 Communication and a connection to the midwife

Establishing good communication as well as a connection to the midwife was an overall need among all the women. Communication, in terms of transmitting information, was related to language, where women without a sufficient grasp of English thought of birth as a stressful experience. Women wanted a conversation with the midwife, information and guidance about the natural process of birth to support and enable them to make informed decisions. Some women were planning on using translators during labour, but in some cases, they did not because the midwife did not take the initiative to offer them one, and the women did not ask because they did not want to be considered a nuisance. However, communication in terms of imparting emotions, ideas and knowledge was an even stronger factor in the women's narrative, where the midwives' characteristics were important. They needed a midwife who stayed with them during labour; a midwife who was kind and showed warmth, respect and support in her care. A midwife who made them feel empowered enough to make informed decisions. This finding is in line with those of previous studies on midwives' professionalism in woman-centred care.¹¹⁵⁻¹²⁰ In a recent Icelandic study, migrant women and women with social complications were more than twice as likely to report low levels of respect in maternity care compared to Icelandic women.⁷⁶ Our findings on the need for caring relationships was also evident in previous studies⁵ where it was linked to the women's source of strength and had a positive influence on their well-being and health. Woman-centred care, in a cultural context, supports women's needs, where the midwife creates a birthing atmosphere and forms a reciprocal relationship with the woman using grounded knowledge; this is well described in the midwifery model of care by Berg et al.⁸⁰

The satisfaction that the women experienced during childbirth seems to be largely influenced by the extent to which they communicated with a caring midwife, how much control they had and the extent to which they were able to influence the outcome of the birth experience. This is in line with previous studies on migrant women where experiences of mistreatment during childbirth, such as ineffective communication, loss of autonomy and lack of informed consent, were reported.^{121,122} When the women were supported in ways they considered as supportive and had good communication with the midwife, they experienced comfort and well-being even though they experienced physical pain,; this is very much in line with Schuiling's and Sampse's theory on comfort.⁵⁷

The importance of the women's partners support, both emotional and physical, was evident even though they did not all realise it during pregnancy. The fact that the women, during pregnancy, did not all realise the importance of having their partners' support

during labour gives health professionals a reason to discuss this matter during antenatal care.

They were not keen on medical interventions and were instead more focused on the natural process of childbirth; this finding is not really in line with that of a previous study on how Icelandic doctors and midwives perceived Polish women.¹²³ Women who planned for a non-pharmacological pain management during labour felt disappointed when they could not get the support to go with it because of external conditions such as access and heavy midwifery workload. However, the women's experience of intrapartum care and the overall service they received in this study was better than what they had expected it to be.

5.4 Strength and limitations

5.4.1 Strength and limitations of Study I

This study is the first of its kind in Iceland. Its main strength is the use of registry-based population data spanning more than two decades. Given the prospectively and independently collected data, our study is likely to have minimal selection and information bias. Potential confounding was, in part, counteracted by adjusting for background characteristics during regression analysis and stratifying by parity. Another strength is the large cohort size and the power to detect differences in rare outcomes.

Due to IMBR data registration based on citizenship rather than country of origin, the reference group included migrant women who had received Icelandic citizenship (a total of 6,983 women of all ages received Icelandic citizenship during the research period⁸¹); 21% of the women who received Icelandic citizenship during the research period were from Poland, 12% were from the Philippines, 10% were from Thailand, 2% were from Lithuania (Lietuva), 2% were from Latvia, 1% were from Germany and 1% were from Rumania.⁸¹ According to the Icelandic legislation on the granting of Icelandic citizenship, the applicant must have been a resident in Iceland for three to seven years (depending on former citizenship, marriage, or cohabitation with an Icelandic citizen).¹²⁴ New asylum applications for refugee women of all ages during the study period were 1,130 in total (based on the year of application).⁸¹ The total number of refugee women during the study period was 247 (all ages).⁸¹ These are likely to be the most vulnerable women among the migrants. They are also likely to have a poorer SES than the other migrant women, and therefore, the association with the outcome was probably biased toward the null value.

Another limitation of this study is the missing data on citizenship and HDI classification for 350 migrant women, leading to a risk of distortion related to exposure. However, they were analyzed in the 'all migrant women' group. It is unknown to which group they belong or the reason for the missing data. Combining different origins within the HDI groups may have obscured the differences among the ethnic groups. Additionally, we based part of our analysis on the 2018 HDI, but the evolution of the index over the

research period could have impacted the migrant women's classification. This limitation, i.e. the lack of information on these women's reason for migrating, as well as socio-economic variables, such as education, length of stay in the host country and date of first antenatal visit may have prevented a more accurate identification of the women likely to be the most vulnerable and impeded our ability to gain insight into their associated outcomes. These weaknesses in the data registration provide an opportunity for improvement in data registration in ways that will benefit maternity care.

Previous studies on the risk of adverse maternal and perinatal outcomes in migrant women compared to women in the host country have shown inconsistent results, with heterogeneity in study designs and the definitions of exposure groups. The Icelandic migrant group of women differs from that of other Nordic countries in terms of country of origin/citizenship and reason for migration.¹⁰⁷ This allows a limited comparison of results with previous studies in other Nordic countries, despite other similarities in culture and health.

5.4.2 Strength and limitations of Study II

This study is the first of its kind in Iceland. Its main strength is the use of prospectively and independently collected registry-based population data spanning 11 years; therefore, it is unlikely to have selection and information bias.

A limitation of the study is the lack of information on citizenship for 211 migrant women, which may have led to exposure distortion. However, they were analysed in the 'all migrant women' group. The lack of information on education, length of stay, continuous support during labour, participation in prenatal classes, language skills, use of interpreters and labour pain intensity due to the use of administrative data, was a limitation. This would have allowed for better interpretation of the results. Also, the use of morphine and pethidine in labour may have misled us since we could not rule out whether its use was in fact after childbirth or during emergency CS; thus, this can be considered a limitation of the study.

5.4.3 Strength and limitations in study III

To the best of our knowledge, this is the first study on migrant women's expectations and experience of intrapartum midwifery care in Iceland. There was no selection bias in the second interviews as the women were enrolled before they had their birth experience. The design of the study allowed us to capture a good picture of the research topic. Also, the external transferability of the findings is limited to Polish women migrating to Iceland, the biggest group of migrant women in the country.

The quality of the data collected and reported is inevitably dependent on the interpretation of the authors.

5.5 Implications for practice and future research

The results of this study add to the pool of knowledge on maternal and perinatal outcomes as well as the use of different pain management methods in labour among migrant women in Iceland compared to Icelandic women, and their experience of intrapartum midwifery care.

The midwife's role is to assess the needs of all pregnant women and their families regarding the physical, emotional, social and intellectual aspects of the childbirth process and design care during childbirth with to the aim of meeting these needs. Our results indicate that perhaps the most valuable goal of midwives who prepare migrant women for childbirth is to provide them with a safe space to express their needs and formulate their goals and promote their sense of control and experience of power and the feeling that they have accomplished something at birth. This involves good communication, the use of appropriately trained translators if needed and a woman-centred approach to care involving respect and kindness. Continuity of care⁷⁴ and a provision of culturally sensitive maternal health service¹⁰¹ have been highlighted as important to meeting migrant women's needs, helping them find a sense of meaning in their new country and enhancing positive outcomes of a healthy mother and baby. Continuity of care is a way of empowering all women (especially migrant women, who are considered a vulnerable group) and assessing the needs of women as well as their expectations regarding the childbirth process. During pregnancy, it is important that midwives take advantage of the unique opportunity they have with migrant women to assist them in such a way that they are most empowered for the upcoming challenges related to the birth of their child. Midwives can encourage migrant women to have their partners with them during birth, inform them of the options available to them and encourage them to request an interpreter if needed. To ensure that care is appropriate, respectful and in partnership with all women, cultural competency and anti-discriminatory practice must be improved. This could be achieved through pre- and post-registration training of midwives and other clinical and non-clinical staff involved in the care of migrant women. This training should cover the social, clinical and psychological needs of migrant women and contain up-to-date information regarding policy and current socio-political population influences, as suggested by McNight et al.¹²⁵

The regulation on health insurance for migrants during their first six months in Iceland can furthermore affect their access to care (e.g. fewer antenatal visits, less use of epidurals and fewer labour inductions). Notably, we had no information on the need for or use of interpreters in maternity care. The findings have implications for maternity care practice such as the use of interpreters to ensure good communication, organisation of culturally sensitive antenatal educational programs in different languages, individualised healthcare and clinical care of pregnant women, particularly migrant women with citizenship from countries with a HDI score <0.900.

5.5.1 Future research

Further studies are needed to develop an adequate evidence base on the health of migrant women. Future research should focus on the possible predictors of the different outcomes, the provision of perinatal care and its effect on perinatal outcomes and the experiences of migrant women in Iceland to be able to develop personalised and culturally sensitive antenatal and perinatal care for all women in the country. Additionally, by using the HDI as a social determinant of perinatal and maternal health, the differences in outcomes observed between exposed and unexposed women demonstrate underlying inequalities that might interfere with antenatal and perinatal care. As seen in this research, women with citizenship from countries with lower HDI do worse than those with citizenship from the host country, while women with citizenship from countries with similar HDI as the host country do as well or even better than women with citizenship from the host country. It is important to bear in mind that a possible reason for the contradictory results of studies on migrant women may be the fact that if we cannot delineate different groups of migrant women, the discrimination experienced by women with citizenship from countries in the lower HDI groups will be hidden. This is important for future research.

Migrant women, especially women with citizenship from countries with a HDI score <0.900, are more likely to undergo instrumental birth and emergency CS than Icelandic women. The underlying reasons are not known, but it is important to seek explanations (for example, by studying the access of migrant women to maternity care) in order to make improvements. The need for and actual use of interpreters in maternity services is also an important topic for future research. However, the success and quality of future research depends on whether the acquisition of data and storage is improved.

6 Conclusions

Our results demonstrate that being a migrant woman in Iceland from a country with a low HDI score increased the odds for several maternal and perinatal complications and interventions and decreased odds for the use of non-pharmacological pain management methods without increasing that for the use of pharmacological pain relief. On the other end of the spectrum, migrant women who had citizenship from countries with a high HDI score showed similar outcomes and odds of pain relief use as Icelandic women, except for their lower odds of epidural use. Our results clearly acknowledge that migrant women's care situation in a new country is related to good communication and their connection to others. This study identifies the possible hindrances in maternity care along with factors that promote the health and healthcare needs of migrant childbearing women in Iceland.

The overall aim for the thesis was to create a body of knowledge that offers a deeper understanding on what practices, if any, need to be improved within the Icelandic healthcare system and how migrant women and their new-borns' welfare and health can be ensured. This body of knowledge will be useful for policy making and the practice of maternity care. Equally important is the transfer of this knowledge into the curriculum of midwifery education. To enable midwives to improve care for migrant women and serve the increasingly diverse population in Iceland, professional education, training and a working environment supported by guidelines and responsive policies need to be put in place.

The findings in this study encourage a further look into the inequality in healthcare in Iceland, a country that emphasises equal access to healthcare as a key aim in its healthcare policy. Furthermore, this study indicates an urgent need to improve data collection on maternity care by including migrant health outcomes that are more closely aligned with their needs.

It is our hope that this knowledge will positively affect the practice of midwives and other maternity care providers as well as the curriculum for future midwives in Iceland. By acknowledging migrant women's diversity in terms of their experiences of security, knowledge and personal values, we can implement policies regarding how to provide maternity care for migrant women and protect them during the most vulnerable moment of a woman's life, childbirth.

References

1. World Health Organization. Report on the health of refugees and migrants in the WHO European Region: No public health without refugee and migrant health. Available from: <https://iris.who.int/bitstream/handle/10665/311347/9789289053846-eng.pdf>
2. Statistics Iceland [Internet]. The numbers of immigrants continue to increase; 2019 [cited 2020 Jan 20]. Available from: https://hagstofa.is/utgafur/frettasafn/mannfjoldi/innflytjendur/?fbclid=IwARORrgMnmVWSklBR4F_L6cPwipf3EU3_jvXzeOpA7nqDuDIYRGrDYi_H74
3. Statistics Norway [Internet]. 14 percent of population are immigrants; 2018 [cited 2020 Jan 20]. Available from: <https://www.ssb.no/en/befolkning/artikler-og-publikasjoner/14-per-cent-of-population-are-immigrants>
4. Statistics Denmark [Internet]. Immigrants and their descendants [cited 2020 Jan 25]. Available from: <https://www.dst.dk/en/Statistik/emner/befolkning-og-valg/indvandrere-og-efterkommere>
5. Balaam, M.C., Haith-Cooper, M., Pařízková, A., Weckend, M.J., Fleming, V., Roosalu, T., Vržina, S.Š. A concept analysis of the term migrant women in the context of pregnancy. *Int J Nurs Pract.* 2017 Dec;23(6):e12600. <https://doi.org/10.1111/ijn.12600>
6. Guðmundsdóttir, G.E. & Þórisdóttir, M.R. Samanburður á útkomu úr meðgöngu og fæðingu kvenna af íslenskum og erlendum uppruna: Afturvirk þversniðsrannsókn (Comparison of the outcome of pregnancy and childbirth in women of Icelandic and foreign origin: Retrospective cross-sectional study). 2014. Available from: <https://skemman.is/bitstream/1946/18420/1/Samanburður%20á%20útkomu%20úr%20meðgöngu%20og%20fæðingu%20kvenna%20af%20íslenskum%20og%20erlendum%20uppruna.pdf>
7. Walsh, J., Mahony, R., Armstrong, F., Ryan, G., O'herlihy, C., Foley, M. Ethnic variation between white European women in labour outcomes in a setting in which the management of labour is standardized—a healthy migrant effect? *Midwifery Digest.* 2011;21(3):335. <https://doi.org/10.1111/j.1471-0528.2010.02878.x>

8. David, M., Pachaly, J., Vetter, K. Perinatal outcome in Berlin (Germany) among immigrants from Turkey. *Archives of gynecology and obstetrics*. 2006 Aug;274:271-8. <https://doi.org/10.1007/s00404-006-0182-7>
9. Hennegan, J., Redshaw, M., Miller, Y. Born in another country: women's experience of labour and birth in Queensland, Australia. *Women and Birth*. 2014;27(2):91-7. <https://doi.org/10.1016/j.wombi.2014.02.002>
10. Zanconato, G., Iacovella, C., Parazzini, F., Bergamini, V., Franchi, M. Pregnancy outcome of migrant women delivering in a public institution in northern Italy. *Gynecologic and obstetric investigation*. 2011;72(3):157-62. <https://doi.org/10.1159/000328318>
11. Gagnon, A.J., Zimbeck, M., Zeitlin, J., Collaboration R. Migration to western industrialised countries and perinatal health: a systematic review. *Social science & medicine*. 2009;69(6):934-46. <https://doi.org/10.1016/j.socscimed.2009.06.027>
12. Urquia, M.L., Glazier, R.H., Blondel, B., Zeitlin, J., Gissler, M., Macfarlane, A., et al. International migration and adverse birth outcomes: role of ethnicity, region of origin and destination. *Journal of Epidemiology & Community Health*. 2010;64(3):243-51. <http://dx.doi.org/10.1136/jech.2008.083535>
13. Viken, B., Balaam, M., Lyberg, A. A salutogenic perspective on maternity care for migrant women. In: Church SF, L., Balaam, M.-C., Berg, M., Smith, V., van der Walt, C., Downe, S., van Teijlingen, E.(eds), editor. *New Thinking on Improving Maternity Care*. London: Printer & Martin; 2017. ISBN 978-1-78066-240-4
14. IOM (International Organization for Migration). *World migration report 2018*.
15. World Health Organization. Regional Office for Europe. *How health systems can address health inequities linked to migration and ethnicity*. World Health Organization. Regional Office for Europe, 2010. ISBN 978-9-28900-204-2. Available from: <https://iris.who.int/handle/10665/345463>
16. European Public Health Association. *Statement by the European Public Health Association (EUOHA) on migration, ethnicity and health*. Available from: https://eupha.org/repository/advocacy/EUPHA_statement_on_migrant_and_ethnic_minority_health.pdf
17. Global Health Europe. *Inequity and inequality in health*. 2009. Available from: <https://globalhealthurope.org/values/inequity-and-inequality-in-health/>
18. Fiscella, K., & Williams, D. R. Health disparities based on socioeconomic inequities: implications for urban health care. *Academic Medicine*.

2004;79(12), 1139-1147. Available from:
https://journals.lww.com/academicmedicine/Fulltext/2004/12000/Health_Disparities_Based_on_Socioeconomic.4.aspx

19. Equality, Equity, Justice [Online image].
<https://www.mobilizegreen.org/blog/2018/9/30/environmental-equity-vs-environmental-justice-whats-the-difference>.
20. Saunders, M., Barr, B., McHale, P., Hamelmann, C. Key policies for addressing the social determinants of health and health inequities. Copenhagen: WHO Regional Office for Europe; 2017 (Health Evidence Network (HEN) synthesis report 52). ISBN 978-92-890-5265-8
21. Bastola, K., Koponen, P., Gissler, M., Kinnunen, T.I. Differences in caesarean delivery and neonatal outcomes among women of migrant origin in Finland: A population-based study. *Paediatric and Perinatal Epidemiology*. 2020 Jan;34(1):12-20. <https://doi.org/10.1111/ppe.12611>
22. Malin, M., Gissler, M. Maternal care and birth outcomes among ethnic minority women in Finland. *BMC Public Health*. 2009;9(1):84. <https://doi.org/10.1186/1471-2458-9-84>
23. Mæland, K.S., Sande, R.K., Bing-Jonsson, P.C. Risk for delivery complications in Robson Group 1 for non-Western women in Norway compared with ethnic Norwegian women—A population-based observational cohort study. *Sexual & Reproductive Healthcare*. 2019 Jun 1;20:42-5. <https://doi.org/10.1016/j.srhc.2019.02.006>
24. Bakken, K.S., Skjeldal, O.H., Stray-Pedersen, B. Higher risk for adverse obstetric outcomes among immigrants of African and Asian descent: a comparison study at a low-risk maternity hospital in Norway. *Birth*. 2015 Jun;42(2):132-40. <https://doi.org/10.1111/birt.12165>
25. Liu, C., Ahlberg, M., Hjern, A., Stephansson, O. Perinatal health of refugee and asylum-seeking women in Sweden 2014–17: a register-based cohort study. *European Journal of Public Health*. 2019 Dec 1;29(6):1048-55. <https://doi.org/10.1093/eurpub/ckz120>
26. Huddleston, T. Migrant Integration Policy Index 2015: MIPEX 2015. CIDOB; 2015. <http://www.mipex.eu>
27. Vik, E.S., Aasheim, V., Schytt, E., Small, R., Moster, D., Nilsen, R.M. Stillbirth in relation to maternal country of birth and other migration related factors: a population-based study in Norway. *BMC Pregnancy and Childbirth*. 2019 Dec 1;19(1):5. <https://doi.org/10.1186/s12884-018-2140-3>

28. Juárez, S.P., Small, R., Hjern, A., Schytt, E. Caesarean birth is associated with both maternal and paternal origin in immigrants in Sweden: a population-based study. *Paediatric and Perinatal Epidemiology*. 2017 Nov;31(6):509-21. <https://doi.org/10.1111/ppe.12399>
29. Bastola, K., Koponen, P., Härkänen, T., Luoto, R., Gissler, M., Kinnunen, T.I. Delivery and its complications among women of Somali, Kurdish, and Russian origin, and women in the general population in Finland. *Birth*. 2019 Mar;46(1):35-41. <https://doi.org/10.1111/birt.12357>
30. Helgesson, M., Johansson, B., Nordquist, T., Vingård, E., & Svartengren, M. Healthy migrant effect in the Swedish context: a register-based, longitudinal cohort study. *BMJ open*. 2019;9(3), e026972. <http://dx.doi.org/10.1136/bmjopen-2018-026972>
31. Lundholm E, Garvill J, Malmberg G, Westin K. Forced or free movers? The motives, voluntariness and selectivity of interregional migration in the Nordic countries. *Population, Space and Place*. 2004 Jan;10(1):59-72. <https://doi.org/10.1002/psp.315>
32. UN-DESA O. World migration in figures. A Joint Contribution by UN-DESA and the OECD to the United Nations High-Level Dialogue on Migration and Development. 2013. Available from: <https://www.oecd.org/els/mig/World-Migration-in-Figures.pdf>
33. Liebig, T., & Widmaier, S. Children of immigrants in the labour markets of EU and OECD countries: An overview. 2009. <https://doi.org/10.1787/1815199X>
34. Skaptadóttir, U.D. & Loftsdóttir, K. Konur af erlendum uppruna: Hvar kreppir að? Skýrsla unnin fyrir félagsmálaráðuneytið. [Women of foreign origin: Where is the crisis? Report for the Ministry of Social Affairs]. Háskóli Íslands, 2019. ISBN 978-9935-9477-4-1
35. Bollini, P., Pampallona, S., Wanner, P., Kupelnick, B. Pregnancy outcome of migrant women and integration policy: a systematic review of the international literature. *Social Science & Medicine*. 2009 Feb 1;68(3):452-61. <https://doi.org/10.1016/j.socscimed.2008.10.018>
36. Ekéus, C., Cnattingius, S., Hjern, A. Epidural analgesia during labor among immigrant women in Sweden. *Acta obstetricia et gynecologica Scandinavica*. 2010;89(2):243-9. <https://doi.org/10.3109/00016340903508668>
37. Templeton, L., Velleman, R., Persaud, A., Milner, P. The experiences of postnatal depression in women from black and minority ethnic communities in Wiltshire, UK. *Ethn Health*. 2003;8(3):207–221. <https://doi.org/10.1080/1355785032000136425>

38. Soet, J.E., Brack, G.A. & Dilorio, C. Prevalence and predictors of women's experience of psychological trauma during childbirth. *Birth*. 2003;30, 36-46. <https://doi.org/10.1046/j.1523-536X.2003.00215.x>
39. Halldorsdottir, S. & Karlsdottir, S.I. Empowerment or discouragement: women's experience of caring and uncaring encounters during childbirth. *Health Care Women International*. 1996;17, 361-379. <https://doi.org/10.1080/07399339609516251>
40. Akhavan, S., Lundgren, I. Midwives' experiences of doula support for immigrant women in Sweden—A qualitative study. *Midwifery*. 2012;28(1):80-5. <https://doi.org/10.1016/j.midw.2010.11.004>
41. Minervino, S., & Martin, M.C. Cultural competence and cultural mediation: Diversity strategies and practices in health care. *Translocations*. 2007;2(1), 190-198. Available from: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=01406acc4f8a3eccf9f2f1efa5a372ceafa262fc>
42. Hodnett, E.D., Gates, S., Hofmeyr, G.J., Sakala, C. Continuous support for women during childbirth. *Cochrane Database Syst Rev*. 2007;3(CD003766). <https://doi.org/10.1002/14651858.CD003766.pub5>
43. Essén, B., Bødker, B., Sjöberg, N.O., Langhoff-Roos, J., Greisen, G., Gudmundsson, S., et al. Are some perinatal deaths in immigrant groups linked to suboptimal perinatal care services? *BJOG: an International Journal of Obstetrics & Gynaecology*. 2002;109(6):677-82. [https://doi.org/10.1016/S1470-0328\(02\)01077-7](https://doi.org/10.1016/S1470-0328(02)01077-7)
44. Juárez, S.P., Revuelta-Eugercios, B.A. Exploring the 'Healthy Migrant Paradox' in Sweden. A cross sectional study focused on perinatal outcomes. *Journal of Immigrant and Minority Health*. 2016 Feb 1;18(1):42-50. <https://doi.org/10.1007/s10903-015-0157-5>
45. Villar, J., Bergsjö, P. Scientific basis for the content of routine antenatal care Philosophy, recent studies, and power to eliminate or alleviate adverse maternal outcomes. *Acta obstetrica et gynecologica Scandinavica*. 1997;76(1):1-14. <https://doi.org/10.3109/00016349709047778>
46. Alderliesten, M., Vrijkotte, T., Van Der Wal, M., Bonsel, G. Late start of antenatal care among ethnic minorities in a large cohort of pregnant women. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2007;114(10):1232-9. <https://doi.org/10.1111/j.1471-0528.2007.01438.x>
47. Robertson E, Malmström M, Johansson SE. Do foreign-born women in Sweden have an increased risk of non-normal childbirth? *Acta obstetrica et*

gynecologica Scandinavica. 2005;84(9):825-32.
<https://doi.org/10.1080/j.0001-6349.2005.00686.x>

48. Gissler, M., Mohangoo, A.D., Blondel, B., Chalmers, J., Macfarlane, A., Gaizauskiene, A., et al. Perinatal health monitoring in Europe: results from the EUROPERISTAT project. *Informatics for Health and Social Care*. 2010;35(2):64-79. <https://doi.org/10.3109/17538157.2010.492923>
49. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: World Health Organization. 2016. ISBN 978 92 4 154991 2
50. National Institute for Health and Care Excellence (NICE): Quality standard for antenatal care, London, QS22, 2012. Available from: <https://www.nice.org.uk/guidance/qs22>
51. Zeitlin, J., Mohangoo, A.D., Delnorn, M., Alexander, S., Blondel, B., Bouvier-Colle, M.H., et al. European Perinatal Health Report. The health and care of pregnant women and babies in Europe in 2010. Paris: Euro Peristat; 2013 2013-01-01. Available from: <http://www.europeristat.com>.
52. Gillet, E., Saerens, B., Martens, G., Cammu, H. Fetal and infant health outcomes among immigrant mothers in Flanders, Belgium. *International Journal of Gynecology & Obstetrics*. 2014;124(2):128-33. <https://doi.org/10.1016/j.ijgo.2013.07.031>
53. Ismail, K.I., Marchocki, Z., Brennan, D.J., O'Donoghue, K. Intrapartum caesarean rates differ significantly between ethnic groups—Relationship to induction. *European Journal of Obstetrics and Gynecology and Reproductive Biology*. 2011;158(2):214-9. <https://doi.org/10.1016/j.ejogrb.2011.06.009>
54. Swift, E.M., Tomasson, G., Gottfreðsdóttir, H., Einarsdóttir, K., & Zoega, H. Obstetric interventions, trends, and drivers of change: A 20-year population-based study from Iceland. *Birth*. 2018;45(4), 368-376. <https://doi.org/10.1111/birt.12353>
55. Seijmonsbergen-Schermers, A.E., van den Akker, T., Rydahl, E., Beeckman, K., Bogaerts, A., Binfa, L., Frith, L., Gross, M.M., Misselwitz, B., Hálfðánsdóttir, B., Daly, D., Corcoran, P., Calleja-Agius, J., Calleja, N., Gatt, M., Vika Nilsen, A.B., Declercq, E., Gissler, M., Heino, A., Lindgren, H., de Jonge, A. Variations in use of childbirth interventions in 13 high-income countries: A multinational cross-sectional study. *PLoS Med*. 2020 May 22;17(5):e1003103. <https://doi.org/10.1371/journal.pmed.1003103>
56. Vangen, S., Stoltenberg, C., Skrondal, A., Magnus, P., STRAY-PEDERSEN, B. Cesarean section among immigrants in Norway. *Acta Obstetricia et*

57. Schuiling, K.D. Promoting comfort: A conceptual approach. Supporting a physiologic approach to pregnancy and birth: A practical guide. 2013 Jun 3:77-89. <https://doi.org/10.1002/9781118783320.ch5>
58. Chaillet, N., Belaid, L., Crochetiere, C., Roy, L., Gagné, G.P., Moutquin, J.M., Rossignol, M., Dugas, M., Wassef, M., Bonapace, J. Nonpharmacologic approaches for pain management during labor compared with usual care: a meta-analysis. *Birth*. 2014 Jun;41(2):122-37. <https://doi.org/10.1111/birt.12103>
59. Czech, I., Fuchs, P., Fuchs, A., Lorek, M., Tobolska-Lorek, D., Drosdzol-Cop, A., Sikora, J. Pharmacological and Non-Pharmacological Methods of Labour Pain Relief-Establishment of Effectiveness and Comparison. *Int J Environ Res Public Health*. 2018 Dec 9;15(12):2792. <https://doi.org/10.3390/ijerph15122792>
60. Steel, A., Adams, J., Sibbritt, D., Broom, A., Gallois, C., Frawley, J. Managing the pain of labour: factors associated with the use of labour pain management for pregnant Australian women. *Health Expectations*. 2015 Oct;18(5):1633-44. <https://doi.org/10.1111/hex.12155>
61. Ekéus, C., Hjern, A., Hjelmstedt, A. The need for epidural analgesia is related to birthweight—a population-based register study. *Acta obstetricia et gynecologica Scandinavica*. 2009 Jan 1;88(4):397-401. <https://doi.org/10.1080/00016340902763236>
62. Robertson, E., Johansson, S.E. Use of complementary, non-pharmacological pain reduction methods during childbirth among foreign-born and Swedish-born women. *Midwifery*. 2010 Aug 1;26(4):442-9. <https://doi.org/10.1016/j.midw.2008.10.005>
63. Rust, G., Nembhard, W.N., Nichols, M., Omole, F., Minor, P., Barosso, G., Mayberry, R. Racial and ethnic disparities in the provision of epidural analgesia to Georgia Medicaid beneficiaries during labor and delivery. *American journal of obstetrics and gynecology*. 2004 Aug 1;191(2):456-62. <https://doi.org/10.1016/j.ajog.2004.03.005>
64. Bakken, K.S., Skjeldal, O.H., Stray-Pedersen, B. Immigrants from conflict-zone countries: an observational comparison study of obstetric outcomes in a low-risk maternity ward in Norway. *BMC pregnancy and childbirth*. 2015 Dec;15(1):1-2. <https://doi.org/10.1186/s12884-015-0603-3>
65. Small, R., Gagnon, A., Gissler, M., Zeitlin, J., Bennis, M., Glazier, R.H., Haelterman, E., Martens, G., McDermott, S., Urquia, M., Vangen, S. Somali women and their pregnancy outcomes postmigration: data from six receiving

- countries. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2008 Dec;115(13):1630-40. <https://doi.org/10.1111/j.1471-0528.2008.01942.x>
66. Bastola, K., Koponen, P., Härkänen, T., Luoto, R., Gissler, M., Kinnunen, T.I. Delivery and it's complications among women of Somali, Kurdish, and Russian origin, and women in the general population in Finland. *Birth*. 2019 Mar;46(1):35-41. <https://doi.org/10.1111/birt.12357>
67. Duff, C., Sinclair, M. Exploring the risks associated with induction of labour: a retrospective study using the NIMATS database. *Journal of Advanced Nursing*, 2000;31:410–417. <https://doi.org/10.1046/j.1365-2648.2000.01335.x>
68. Fabian, H.M., Rådestad, I.J., Waldenström, U. Childbirth and parenthood education classes in Sweden. Women's opinion and possible outcomes. *Acta obstetrica et gynecologica Scandinavica*. 2005 Jan 1;84(5):436-43. <https://doi.org/10.1080/j.0001-6349.2005.00732.x>
69. Maimburg, R.D., Vaeth, M., Dürr, J., Hvidman, L., Olsen, J. Randomised trial of structured antenatal training sessions to improve the birth process. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2010 Jul;117(8):921-8. <https://doi.org/10.1111/j.1471-0528.2010.02584.x>
70. Small, R., Yelland, J., Lumley, J., Brown, S., Liamputtong, P. Immigrant women's views about care during labor and birth: an Australian study of Vietnamese, Turkish, and Filipino women. *Birth*. 2002 Dec;29(4):266-77. <https://doi.org/10.1046/j.1523-536X.2002.00201.x>
71. Räisänen, S., Kokki, M., Kokki, H., Gissler, M., Kramer, M.R., Heinonen, S. The use of epidural analgesia for intrapartum pain relief in publicly funded healthcare. *Acta Anaesthesiologica Scandinavica*. 2014 Mar;58(3):291-7. <https://doi.org/10.1111/aas.12268>
72. Razum, O., Reiss, K., Breckenkamp, J., Kaufner, L., Brenne, S., Bozorgmehr, K., Borde, T., David, M. Comparing provision and appropriateness of health care between immigrants and non-immigrants in Germany using the example of neuraxial anaesthesia during labour: cross-sectional study. *BMJ open*. 2017 Aug 1;7(8):e015913. <http://dx.doi.org/10.1136/bmjopen-2017-015913>
73. World Health Organization. Regional Office for Europe. Improving the health care of pregnant refugee and migrant women and newborn children: technical guidance. World Health Organization. Regional Office for Europe, 2018. <https://apps.who.int/iris/handle/10665/342289>
74. Balaam, M.C., Akerjordet, K., Lyberg, A., Kaiser, B., Schoening, E., Fredriksen, A.M., et al. A qualitative review of migrant women's perceptions of their needs

- and experiences related to pregnancy and childbirth. *Journal of advanced nursing*. 2013;69(9):1919-30. <https://doi.org/10.1111/jan.12139>
75. Billett, H., Corona, M.V., Bohren, M.A. Women from migrant and refugee backgrounds' perceptions and experiences of the continuum of maternity care in Australia: A qualitative evidence synthesis. *Women and Birth*. 2021 Aug 21;35(4):327-339. <https://doi.org/10.1016/j.wombi.2021.08.005>
 76. Mangindin, E.L., Stoll, K., Cadée, F., Gottfreðsdóttir, H., & Swift, E.M. Respectful maternity care and women's autonomy in decision making in Iceland: Application of scale instruments in a cross-sectional survey. *Midwifery*. 2023;123, 103687. <https://doi.org/10.1016/j.midw.2023.103687>
 77. Kuipers, Y.J., Mestdagh, E. The experiential knowledge of migrant women about vulnerability during pregnancy: A woman-centred mixed-methods study. *Women and Birth* 2022; 35(1):70-9. <https://doi.org/10.1016/j.wombi.2021.03.004>
 78. Sigurdardóttir, V.L., Gamble, J., Gudmundsdóttir, B., Kristjansdóttir, H., Sveinsdóttir, H., Gottfredsdóttir, H. The predictive role of support in the birth experience: A longitudinal cohort study. *Women and Birth*. 2017 Dec 1;30(6):450-9. <https://doi.org/10.1016/j.wombi.2017.04.003>
 79. Hodnett, E. Pain and women's satisfaction with the experience of childbirth: A systematic review. *American Journal of Obstetrics and Gynecology*. 2002;186, 160-172. [https://doi.org/10.1016/S0002-9378\(02\)70189-0](https://doi.org/10.1016/S0002-9378(02)70189-0)
 80. Berg, M., Olafsdóttir, O., Lundgren, I. A Midwifery model of woman-centred childbirth care – in Swedish and Icelandic settings. *Sexual Reprod Healthcare*. 2012;3 (2), pp. 79-87. <https://doi.org/10.1016/j.srhc.2012.03.001>
 81. Iceland S. Immigrants and persons with foreign background 1996–2008. *Statistical Series*. 2009;94(4):1-24. ISBN-13:978-ö-4709-6286-1/2013.
 82. Conceição, P. Beyond Income, beyond Averages, beyond Today: Inequalities in Human Development in the 21st Century. UNDP; New York, NY, USA: 2019. *Human Development Report*. 2019. Available from: <https://hdr.undp.org/content/human-development-report-2019>
 83. Statistics Iceland [Internet]. The numbers of immigrants continue to increase; 2019 [cited 2020 Jan 20]. Available from: https://hagstofa.is/utgafur/frettasafn/mannfjoldi/innflytjendur/?fbclid=IwARORrgMnmVWSkIBR4F_L6cPwipf3EU3_jvxXzeOpA7nqDuDIYRGrDYi_H74
 84. Government of Iceland, Ministry of Welfare. Immigrants in Iceland; 2019 [cited 2021 Mar 10]. Available from: <https://www.stjornarradid.is/media/velferdarraduneyti-media/media/acrobat->

skjol/lnnflytjendur_skyrslaOkt2009.pdf

85. Statistics Iceland [Internet]. Special edition on immigrants in Iceland; 2019 [cited 2020 Feb]. Available from: <http://hagstofan.s3.amazonaws.com/media/public/2019/901e98bb-a182-4dc1-9059-261b7bea719b.pdf>
86. Statistics Iceland [Internet]. Number of employed persons, years, sex, age and background 2008-2018 [cited 2020 Feb]. Available from: https://px.hagstofa.is/pxis/pxweb/is/Samfelag/Samfelag__vinnumarkadur__vinnuafskraargogn/VIN10020.px
87. Runyan, A.S. What is Intersectionality and why is it important? *Academie*. 2018;104(6). <https://www.jstor.org/stable/26606288>
88. World Health Organization. Integrating poverty and gender into health programmes: a sourcebook for health professionals: module on sexual and reproductive health, 2008. Available from: <https://iris.who.int/handle/10665/206996>
89. International Confederation of Midwives. International Code of Ethics for Midwives. 2014. The Hague. Available from: <https://www.internationalmidwives.org/assets/files/general-files/2019/10/eng-international-code-of-ethics-for-midwives.pdf>
90. Lyberg, A., Viken, B., Haruna, M., & Severinsson, E. Diversity and challenges in the management of maternity care for migrant women. *Journal of nursing management*. 2012;20(2), 287-295. <https://doi.org/10.1111/j.1365-2834.2011.01364.x>
91. Anderson, L.M., Scrimshaw, S.C., Fullilove, M.T., Fielding, J.E., Normand, J. Culturally competent healthcare systems: A systematic review. *American journal of preventive medicine*. 2003;24(3):68-79. [https://doi.org/10.1016/S0749-3797\(02\)00657-8](https://doi.org/10.1016/S0749-3797(02)00657-8)
92. McLeish, J., & Alliance, M. Mothers in exile. The Maternity Alliance, London. Available from: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=246cc767cdb6b7e36cc11d61c5a8dfbe053b6b8a>
93. Icelandic Health Insurance [Internet]. Health insurance in Iceland, interpreter service, 2002 [cited 2020 Sep 18]. Available from: <https://www.sjukra.is/english/social-insurance-in-iceland/interpreter-service/>
94. Guðmundsdóttir, E.Ý., Nieuwenhuijze, M., Einarsdóttir, K., Hálfhánsdóttir, B., Gottfreðsdóttir, H. Use of pain management in childbirth among migrant women

- in Iceland: A population-based cohort study. *Birth*. 2022 Sep;49(3):486-96. <https://doi.org/10.1111/birt.12619>
95. Betancourt, J.R., Green, A.R., Carrillo, J.E., Ananeh-Firempong, O. 2nd. Defining cultural competence: a practical framework for addressing racial/ethnic disparities in health and health care. *Public Health Rep*. 2003 Jul-Aug;118(4):293-302. <https://doi.org/10.1093/phr/118.4.29>
 96. Simkin, P. Reducing pain and enhancing progress in labor: a guide to nonpharmacologic methods for maternity caregivers. *Birth*. 1995;22(3), 161-171. <https://doi.org/10.1111/j.1523-536X.1995.tb00693.x>
 97. Hodnett, E. Nursing support of the laboring woman. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 1996;25(3), 257-264. <https://doi.org/10.1111/j.1552-6909.1996.tb02434.x>
 98. Nordic Centre for Classifications in Health Care. NOMESCO Classification of Surgical Procedures (NCSP), version 1.15. ISBN 978-87-89702-75-9.
 99. Braun, V., Clarke, V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*. 2019;11(4), pp. 589-597. <https://doi.org/10.1080/2159676X.2019.1628806>
 100. Braun, V., Clarke, V. Using thematic analysis in psychology. *Qualitative research in psychology*. 2006 Jan 1;3(2):77-101. <https://doi.org/10.1191/1478088706qp063oa>
 101. Benza, S., Liamputtong, P. Pregnancy, childbirth and motherhood: a metasynthesis of the lived experiences of immigrant women. *Midwifery*. 2014;30(6):575-84. <https://doi.org/10.1016/j.midw.2014.03.005>
 102. Abubakar, I., Aldridge, R.W., Devakumar, D., Orcutt, M., Burns, R., Barreto, M.L., Dhavan, P., Fouad, F.M., Groce, N., Guo, Y., Hargreaves, S. The UCL–Lancet Commission on Migration and Health: the health of a world on the move. *The Lancet*. 2018 Dec 15;392(10164):2606-54. [https://doi.org/10.1016/S0140-6736\(18\)32114-7](https://doi.org/10.1016/S0140-6736(18)32114-7)
 103. American College of Obstetricians and Gynaecologists. Operative Vaginal Birth: ACOG Practice Bulletin, Number 219. *Obstetrics and Gynaecology*. 2020 Apr;135(4):e149-59. <https://doi.org/10.1097/AOG.0000000000003764>
 104. Merry, L., Small, R., Blondel, B., Gagnon, A.J. International migration and caesarean birth: a systematic review and meta-analysis. *BMC Pregnancy and Childbirth*. 2013 Dec 1;13(1):27. <https://doi.org/10.1186/1471-2393-13-27>
 105. Guðmundsdóttir, E.Ý., Vigfúsdóttir, L. & Gottfreðsdóttir, H. Tíðni

- fyrirburafæðinga og áhættuþátta hjá íslenskum konum og konum af erlendum uppruna á árunum 1997-2018 (Preterm birth among Icelandic and migrant women in Iceland during 1997-2018 and main influencing factors). *Læknablaðið*. 2023;109(2), 75-81. <https://doi.org/10.17992/lbl.2023.02.729>
106. Zhou, Q., Zhang, W., Xu, H., et al. Risk factors for preterm premature rupture of membranes in Chinese women from urban cities. *Int J Gynecol Obstetr* 2014; 127: 254-9. <https://doi.org/10.1016/j.ijgo.2014.06.020>
 107. Karlsdóttir, A., Rispling, L., Norlén, G., Randall, L., Gassen, N.S., Heleniak, T., Peurell, E., Rehn-Mendoza, N., Lagercrantz, H. State of the Nordic Region 2018: Immigration and integration edition. Nordic Council of Ministers; 2018 Mar 22. <http://dx.doi.org/10.6027/ANP2018-742>
 108. Robertson, E. Aspects of foreign-born womens health and childbirth-related outcomes: An epidemiological study of women of childbearing age in Sweden. Institutionen för klinisk vetenskap/Department of Clinical Sciences; 2003 Nov 7. ISBN 91-7349-727-4
 109. Marchand, S. *The Phenomenon of Pain*. Seattle: IASP Press; 2012. ISBN 978-0-931092-91-6
 110. Williams, B., Healy, D. Perceptions of illness causation among new referrals to a community mental health team: “explanatory model” or “exploratory map”? *Social science & medicine*. 2001 Aug 1;53(4):465-76. [https://doi.org/10.1016/S0277-9536\(00\)00349-X](https://doi.org/10.1016/S0277-9536(00)00349-X)
 111. Aasheim, V., Nilsen, R.M., Vik, E.S., Small, R., Schytt, E. Epidural analgesia for labour pain in nulliparous women in Norway in relation to maternal country of birth and migration related factors. *Sexual & Reproductive Healthcare*. 2020 Dec 1;26:100553. <https://doi.org/10.1016/j.srhc.2020.100553>
 112. Ledoux, C. Principles of best and good practices in migrants’ access to health services. *Albanian Med J*. 2015;4:62-71. Available from: http://www.ishp.gov.al/wp-content/uploads/2018/10/Celine_Ledoux2.pdf
 113. Simkin, P., Bolding, A. Update on nonpharmacologic approaches to relieve labor pain and prevent suffering. *Journal of Midwifery & Women’s Health*. 2004 Nov 1;49(6):489-504. <https://doi.org/10.1016/j.jmwh.2004.07.007>
 114. Hodnett, E.D. Pain and women’s satisfaction with the experience of childbirth: a systematic review. *American journal of obstetrics and gynecology*. 2002 May 1;186(5):S160-72. [https://doi.org/10.1016/S0002-9378\(02\)70189-0](https://doi.org/10.1016/S0002-9378(02)70189-0)
 115. Halldorsdottir, S., Karlsdottir, S.I. The primacy of the good midwife in midwifery services: an evolving theory of professionalism in midwifery. *Scandinavian*

journal of caring sciences. 2011 Dec;25(4):806-17.
<https://doi.org/10.1111/j.1471-6712.2011.00886.x>

116. Butler, M., Fraser, D.M., Murphy, R.J.L. What are the essential competencies required of a midwife at the point of registration? *Midwifery* 2008; 24: 260–9.
<https://doi.org/10.1016/j.midw.2006.10.010>
117. Lundgren, I., Dahlberg, K. Midwives' experience of the encounter with women and their pain during childbirth. *Midwifery* 2002; 18: 155– 64.
<https://doi.org/10.1054/midw.2002.0302>
118. Byrom, S., Downe, S. "She sort of shines": midwives' accounts of good midwifery and good leadership. *Midwifery* 2010; 26: 126– 37.
<https://doi.org/10.1016/j.midw.2008.01.011>
119. Nicolls, L., Webb, C. What makes a good midwife? An integrative review of methodologically-diverse research. *J Adv Nurs* 2006; 56: 414– 29.
<https://doi.org/10.1111/j.1365-2648.2006.04026.x>
120. Page, L. One-to-one midwifery: restoring the "with woman" relationship in midwifery. *J Midwifery Womens Health* 2003; 48: 119– 25.
[https://doi.org/10.1016/S1526-9523\(02\)00425-7](https://doi.org/10.1016/S1526-9523(02)00425-7)
121. Vedam, S., Stoll, K., Taiwo, T. K., Rubashkin, N., Cheyney, M., Strauss, N., ... & Declercq, E. The Giving Voice to Mothers study: inequity and mistreatment during pregnancy and childbirth in the United States. *Reproductive health*. 2019;16(1), 1-18.
<https://doi.org/10.1186/s12978-019-0729-2>
122. Vogel, J.P., Bohren, M.A., Tunçalp, Ö., Oladapo, O.T., & Gülmezoglu, A. Promoting respect and preventing mistreatment during childbirth. *Bjog*. 2016;123(5), 671. <https://doi.org/10.1111/1471-0528.13750>.
123. Símonardóttir, S., Rúdólfsdóttir, A.G., Gottfreðsdóttir, H. "We at least say we are equal": Gender equality and class in healthcare professionals' discursive framing of migrant mothers. *Social Science & Medicine*. 2021 Jul 1;281:114089. <https://doi.org/10.1016/j.socscimed.2021.114089>
124. Government of Iceland, Ministry of Justice. Icelandic Nationality Act, No 100/1952, 2017 [citet 2021 Mar 10]. Available from: <https://www.government.is/Publications/Legislation/Lex/?newsid=bc41955e-e63a-11e7-9423-005056bc530c>
125. McKnight, P., Goodwin, L., & Kenyon, S. A systematic review of asylum-seeking women's views and experiences of UK maternity care. *Midwifery*. 2019. <https://doi.org/10.1016/j.midw.2019.06.007>

Original Publications

Paper I

Challenges in migrant women's maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes

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Abstract

Introduction: This study aims to explore maternal and perinatal outcomes of migrant women in Iceland.

Material and methods: This prospective population-based cohort study included women who gave birth to a singleton in Iceland between 1997 and 2018, comprising a total of 92 403 births. Migrant women were defined as women with citizenship other than Icelandic, including refugees and asylum seekers, and categorized into three groups, based on their country of citizenship Human Development Index score. The effect of country of citizenship was estimated. The main outcome measures were onset of labor, augmentation, epidural, perineum support, episiotomy, mode of birth, obstetric anal sphincter injury, postpartum hemorrhage, preterm birth, a 5-minute Apgar <7, neonatal intensive care unit admission and perinatal mortality. Odds ratios (ORs) and 95% confidence intervals (CIs) for maternal and perinatal outcomes were calculated using logistic regression models.

Results: A total of 8158 migrant women gave birth during the study period: 4401 primiparous and 3757 multiparous. Overall, migrant women had higher adjusted ORs (aORs) for episiotomy (primiparas: aOR 1.43, 95% CI 1.26–1.61; multiparas: 1.39, 95% CI 1.21–1.60) and instrumental births (primiparas: 1.14, 95% CI 1.02–1.27, multiparas: 1.41, 95% CI 1.16–1.72) and lower aORs of induction of labor (primiparas: 0.88, 95% CI 0.79–0.98; multiparas: 0.74, 95% CI 0.66–0.83), compared with Icelandic women. Migrant women from countries with a high Human Development Index score (≥ 0.900) had similar or better outcomes compared with Icelandic women, whereas migrant women from countries with a lower Human Development Index score than that of Iceland (< 0.900) had additionally increased odds of maternal and perinatal complications and interventions, such as emergency cesarean and postpartum hemorrhage.

Abbreviations: aOR, Adjusted odds ratio; CI, confidence interval; HDI, Human Development Index; IMBR, Icelandic Medical Birth Registry; OASI, obstetrical anal sphincter injury; OR, odds ratio.

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Conclusions: Women's citizenship and country of citizenship Human Development Index scores are significantly associated with a range of maternal and perinatal complications and interventions, such as episiotomy and instrumental birth. The results indicate the need for further exploration of whether Icelandic perinatal healthcare services meet the care needs of migrant women.

KEYWORDS

childbirth interventions, maternal outcome, migrant, perinatal complications, perinatal outcome

1 | INTRODUCTION

Immigration is steadily increasing worldwide, with almost one in 10 people in the World Health Organization European Region estimated to be an international migrant.¹ Iceland is no exception, with 14.1% of its population holding foreign citizenship in 2019,² which is similar to the percentages in Norway³ and Denmark.⁴ The inequity that migrants face concerning their state of health and access to quality health services has been demonstrated by global researchers and international organizations.⁵

Perinatal outcomes have been previously studied among migrant women in high-income countries. Increased risks of adverse perinatal outcomes have been reported among migrant women in the Nordic countries compared with the host population.^{6–14} However, the results of previous studies have been inconsistent regarding mode of birth,^{7,8,10,12,13,15} maternal outcomes^{8,10,11} and interventions,^{7,15} reflecting heterogeneous study populations, designs and exposure group definitions. Theories regarding better/adverse perinatal outcomes include the healthy migrant effect,¹² socioeconomic disadvantage,^{7,8,10–12,16} suboptimal use or access to care,^{7–9,11,13,16} underlying conditions in the mother^{7,10,12,15,16} and the stress of migration.^{11,16}

Despite increasing global attention to migrants' health,¹⁷ there is limited knowledge on the perinatal health of migrant women in Iceland.

Immigration in Iceland increased from 4.6% in 2006 to 14.1% in 2019.¹⁸ Migrants in Iceland are mostly 15–49 years of age (75%) and 50% of migrants have fewer than 5 years of median duration of stay in the country.² The majority (68%) mention work as their reason for moving to the country.¹⁹ However, they often do not have jobs that suit their education level and have long and non-standard working hours when compared with the Icelandic-born population.¹⁸ Of all migrants, 45% are women,² 43.9% of whom work in production jobs.²⁰ Most migrant women in Iceland come from Poland (34.6%), the Philippines (5.9%), Lithuania (4.9%), other Nordic countries (4.7%), Germany (4.2%), Thailand (3.9%), Latvia (2.6%), Romania (2.2%) and the USA (2.1%),² thus, the majority come from countries where health, education and the economy are considered good.²¹

Active integration with the host population and policies promoting social participation have been linked to lower risks of adverse

Key message

This cohort revealed increased odds of several maternal and perinatal complications and interventions among women with foreign citizenship compared with women with Icelandic citizenship. This difference was increased for women from countries with an HDI score lower than the score for Iceland (<0.900).

maternal and perinatal outcomes in other countries.²² However, despite growing numbers and increasing global attention to migrants' health,⁴ the integration policy in Iceland has been criticized for its lack of an infrastructure that can identify and respond to the specific health and access needs of migrants.¹⁶

This primary objective of this study was to explore maternal and perinatal outcomes among migrant women in Iceland.

2 | MATERIAL AND METHODS

The population in this cohort study included women who gave birth to a singleton in Iceland between 1 January 1997 and 31 December 2018. The data were prospectively collected from the Icelandic Medical Birth Registry (IMBR), which is a routinely collected nationwide centralized administrative registry. It includes information on all births in Iceland from 22+0 weeks' gestation or from infants weighing ≥ 500 g. A total of 92 403 births were included during the study period: 37 456 primiparous women and 54 947 multiparous women. Maternity care in Iceland is part of a publicly funded health-care system and is therefore mostly free of charge; however, legal migrants must pay for health insurance during their first 6 months in Iceland.¹⁶ The recommended number of antenatal care visits in an uncomplicated singleton pregnancy is 10 for healthy primiparas and seven for multiparas. Migrants are entitled to a free interpreter, either via telephone or a face-to-face meeting.²³

Data on maternal characteristics, pregnancy complications and birth characteristics were obtained from the IMBR. Obstetric interventions and birth complications were registered using the following:

- The recorded variables and diagnostic and surgical codes in the IMBR,
- The International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10)
- The Nordic Medico-Statistical Committee Classification of Surgical Procedures (NCSP).²⁴

The exposure variable was both a binominal variable and a trichotomous categorical variable based on registered citizenship. The binominal variable “migrant women” was defined as women with citizenship other than Icelandic, including refugees and asylum seekers. Migrant women who had received Icelandic citizenship were included in the reference group. The trichotomous categorical variable was based on the Human Development Index (HDI), a statistical composite index of life expectancy at birth, education and per capita income indicators.²¹ Due to data protection regulations, we were not able to use the variable country of citizenship. Therefore, HDI scores for year 2018 were categorized by IMBR in 12 groups with increments of 0.050. Due to the small number of migrants coming from countries with a low HDI score, the groups in the lower levels were combined. The lowest 10 categories, including countries such as the Philippines and Pakistan, were merged into a group with an HDI score of ≤ 0.849 . The second group (HDI score = 0.850–0.899) included countries such as Poland and Lithuania, and the third group (HDI score ≥ 0.900) included the Nordic countries and the UK, among other countries with similar health, education and economy levels to those of Iceland. A total of 350 women (4.3% of all migrants) were missing in the HDI classification due to missing data on citizenship but were included in the “all migrant women” group and were analyzed separately.

The following maternal sociodemographic characteristics at the time of giving birth were obtained from the IMBR: citizenship (Icelandic, other and the three HDI groups), age (continuous; ≤ 19 , 20–24, 25–29, 30–34, 35–39 and ≥ 40), parity (0, 1, 2 and ≥ 3), gestational age in full weeks based on routine fetal ultrasound examination in pregnancy weeks 19–21 (continuous; $\leq 36+6$ weeks, 37+0 to 41+6 weeks, $\geq 42+0$ weeks), marital status (married/cohabiting, single/widowed/divorced), residence (capital area, including the capital and six surrounding municipalities, rural), employment during pregnancy (employed, student, homemaker/on disability pension/unemployed), previous cesarean section (ICD-10: O34.2) and year of giving birth (continuous; 1997–2006, 2007–2018). The cut-off year of 2007 was chosen because migrants before that year, made up <2% of the population and their numbers substantially increased after that.²⁵ Information was also obtained on the number of antenatal care visits (continuous; 0, 1–3, 4–8, 9–11 and ≥ 12) and level of birth services, primary (small labor units with midwives and general practitioners, homebirths or birth centers with midwives), secondary (medium-sized labor units with midwives, obstetricians or surgeons with obstetrical training) and tertiary (specialized maternity units with facilities for high-risk pregnancy and labor, with midwives, obstetricians, anesthesiologists, neonatologists and neonatal nurses, surgical service and a Neonatal Intensive Care Unit) healthcare settings. Additionally, data were obtained from during pregnancy and

birth on maternal diagnoses of chronic and pregnancy-related diabetes (ICD-10: O24.0–1, O24.4, O24.9, E10–14), hypertensive disorders (ICD-10: O10–11, O13–14, O15.0–1, O16, I10), HIV (ICD-10: Z21, B20.8), hepatitis (ICD-10: Z22.5, B18.1–2), thalassemia (ICD-10: D56), symphysis pubis dysfunction (ICD-10: O26.7) and obesity (ICD-10: E66.0–2, E66.8–9). Missing variables are presented in Tables 1 and 2.

Perinatal outcomes included induction of labor (IMBR: onset of labor; ICD-10: O83.8; NCSP: MASC00, MAXC02, MAXC09), augmentation of spontaneous onset of labor with oxytocin (NCSP: MAXC00) and amniotomy (NCSP: MASC05), epidural during labor (NCSP: WAA307, ZXXX30), perineal support (IMBR: yes, no), episiotomy (NCSP: MAXX00), instrumental vaginal birth (ICD-10: O81.0–5), elective cesarean section (IMBR: onset of labor; ICD-10: O82.0) and emergency cesarean section (ICD-10: O82.1). Maternal outcomes included obstetric anal sphincter injury (OASI) (ICD-10: O70.2–3) and postpartum hemorrhage (ICD-10: O72.0–3). Neonatal outcomes included preterm birth ($\leq 36+6$ w) (IMBR: continuous), a 5-minute Apgar <7 (IMBR: continuous), Neonatal Intensive Care Unit admission (IMBR: supervision of newborn) and perinatal mortality (IMBR: death of the newborn), which was identified as the intrauterine death of a fetus ≥ 22 weeks' gestational age, and/or ≥ 500 g if gestational age is unknown and the death of a newborn in the first week after birth.

2.1 | Statistical analyses

Chi-square and Fisher's exact tests were used to compare crude rates. We used logistic regression models with listwise deletion of missing data to calculate odds ratios (OR) and 95% confidence intervals (CI) for the differences in maternal and perinatal outcomes between migrant women and Icelandic women, using women with Icelandic citizenship as the reference group. The calculation was made for all women with foreign citizenship and for each of the three HDI groups separately. The models were adjusted for the continuous variables (maternal and gestational age at the time of giving birth, number of antenatal care visits and birth year). The models were also adjusted for the binominal variables (hypertensive disorder, diabetes, HIV, hepatitis, obesity, symphysis pubis dysfunction, thalassemia, marital status, residency and employment status) and the trichotomous variable level of birth services. All analyses were performed separately according to parity and the model for multiparous women was additionally adjusted for the continuous variable previous births and the binominal variable previous cesarean section. All analyses were conducted using statistical software SPSS version 26 (IBM Corp., Armonk, NY, USA).

2.2 | Ethical approval

This study received ethical approval from the National Bioethics Committee on 11 June 2019 (VSNb2019050003/03.01).

TABLE 1 Background characteristics of primiparous women with foreign citizenship and Icelandic citizenship who gave birth to a singleton in Iceland between 1997 and 2018^a

| Characteristics | Primiparous women | | | | | | | | | | | |
|----------------------------|-----------------------|------|---------------------------------|---------|------------------------------------|---------|--|---------|--|---------|---|--------|
| | TOTAL (n = 37 456) | | Icelandic women (n = 33 055) | | All migrant women (n = 4401) | | Migrant women, HDI ≥0, 900 (n = 893) | | Migrant women HDI 0.850–0.899 (n = 2327) | | Migrant women, HDI ≤0, 849 (n = 1004) | |
| | % | % | % | p value | % | p value | % | p value | % | p value | | |
| Maternal age at birth, yr | | | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 |
| ≤19 | 8.4 | 9.1 | 2.9 | | 1.9 | | 3 | | 2.9 | | | |
| 20–24 | 33.2 | 34.4 | 24.3 | | 16.6 | | 27.7 | | 22.5 | | | |
| 25–29 | 36.5 | 35.8 | 41.8 | | 35.9 | | 45 | | 41.2 | | | |
| 30–34 | 15.4 | 14.3 | 23 | | 31.8 | | 19.2 | | 24.2 | | | |
| 35–39 | 5.3 | 5.1 | 6.8 | | 11.6 | | 4.5 | | 7.6 | | | |
| ≥40 | 1.2 | 1.2 | 1.3 | | 2.1 | | 0.6 | | 1.6 | | | |
| Data missing | 0 | 0 | 0.4 | | 0 | | 0 | | 0 | | | |
| Married/ cohabiting | 27.4 | 24 | 60.6 | <0.001 | 35.9 | <0.001 | 60.8 | <0.001 | 80.2 | <0.001 | | <0.001 |
| Data missing | 2.9 | 0.1 | 24.0 | | 10.4 | | 33.5 | | 14.3 | | | |
| Capital area residence | 65.9 | 66.4 | 62.6 | <0.001 | 53.8 | <0.001 | 61.8 | <0.001 | 71 | <0.001 | | 0.002 |
| Data missing | 3.0 | 2.8 | 4.1 | | 11.1 | | 1.5 | | 2.9 | | | |
| Employed/student | 92.3 | 93.5 | 83.8 | <0.001 | 89.1 | <0.001 | 88.1 | <0.001 | 73.3 | <0.001 | | <0.001 |
| Year of giving birth | | | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 |
| 1997–2006 | 43.6 | 46.6 | 20.7 | | 40.5 | | 10.2 | | 23.7 | | | |
| 2007–2018 | 56.4 | 53.4 | 79.3 | | 59.5 | | 89.8 | | 76.3 | | | |
| Data missing | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | |
| Antenatal care visits | | | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 |
| 0 | 0.3 | 0.2 | 0.8 | | 1.1 | | 0.4 | | 0.7 | | | |
| 1–3 | 0.6 | 0.5 | 1.2 | | 0.9 | | 0.8 | | 1.9 | | | |
| 4–8 | 18.5 | 17.1 | 29 | | 24.5 | | 28.1 | | 35 | | | |
| 9–11 | 46.7 | 46.5 | 48.4 | | 46.4 | | 50.3 | | 47.8 | | | |
| ≥12 | 33.9 | 35.7 | 20.6 | | 27.1 | | 20.4 | | 14.7 | | | |
| Data missing | 0 | 0 | 0 | | 0 | | 0 | | 0.1 | | | |
| Gestation | | | | <0.001 | | 0.848 | | 0.009 | | <0.001 | | <0.001 |
| ≤36+6 w | 5.5 | 5.5 | 6.2 | | 5.2 | | 6 | | 7 | | | |
| 37+0 to 41+6 w | 89.5 | 89.4 | 90.2 | | 89.9 | | 90.2 | | 91.1 | | | |
| ≥42+0 w | 5 | 5.1 | 3.6 | | 4.9 | | 3.8 | | 1.9 | | | |
| Data missing | 3.3 | 3.2 | 3.9 | | 4.9 | | 4.1 | | 4.7 | | | |
| Level of birth services | | | | 0.217 | | 0.001 | | 0.001 | | 0.001 | | 0.001 |
| Primary | 7.5 | 7.5 | 7.8 | | 10.8 | | 7.6 | | 5.8 | | | |
| Secondary | 7.9 | 7.8 | 8.5 | | 8.7 | | 10 | | 5.4 | | | |
| Tertiary | 84.6 | 84.7 | 83.7 | | 80.5 | | 82.3 | | 88.8 | | | |
| Data missing | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | |

Co-morbidity

(Continues)

TABLE 1 (Continued)

| Characteristics | Primiparous women | | | | | | | | | | | |
|-----------------------------|-----------------------|-----|---------------------------------|---------|------------------------------------|---------|--|---------|--|---------|---|--|
| | TOTAL (n = 37 456) | | Icelandic women (n = 33 055) | | All migrant women (n = 4401) | | Migrant women, HDI ≥0, 900 (n = 893) | | Migrant women HDI 0.850–0.899 (n = 2327) | | Migrant women, HDI ≤0, 849 (n = 1004) | |
| | % | % | % | p value | % | p value | % | p value | % | p value | | |
| Hypertensive disorder | 4.2 | 4.4 | 2.7 | <0.001 | 2.7 | 0.014 | 3.3 | 0.013 | 1.6 | <0.001 | | |
| Diabetes | 4.3 | 4 | 5.8 | <0.001 | 3.8 | 0.719 | 4.9 | 0.045 | 10.2 | <0.001 | | |
| HIV ^b | 0 | 0 | 0.1 | 0.497 | 0 | 1.000 | 0.1 | 0.093 | 0.3 | 0.002 | | |
| Hepatitis ^b | 0.2 | 0.2 | 0.4 | 0.001 | 0 | 0.411 | 0.3 | 0.210 | 1.1 | <0.001 | | |
| Symphysis pubis dysfunction | 1.9 | 2 | 1 | <0.001 | 0.7 | 0.005 | 0.9 | <0.001 | 1.3 | 0.128 | | |
| Thalassemia ^b | 0 | 0 | 0 | 0.117 | 0 | — | 0 | — | 0.1 | 0.029 | | |
| Obesity | 3.2 | 3.3 | 1.9 | <0.001 | 1.9 | 0.018 | 2.2 | 0.004 | 1.2 | <0.001 | | |

The *p* values for comparison of each group of migrant women with the group of Icelandic women, χ^2 .

Abbreviation: HDI, Human Development Index.

^aDenominators vary because of missing values. HDI: 173 migrant women missing.

^bIf Chi-square tests were not valid due to >20% cells having an expected count <5, the Fisher exact test was used.

3 | RESULTS

The total cohort consisted of 37 456 primiparous women and 54 947 multiparous women, 4401 of whom were migrant primiparous women and 3757 migrant multiparous women, respectively. The migrant primiparous and multiparous women were more often married/cohabiting and less often living in the capital area and employed/students compared with the Icelandic women. They had fewer antenatal care visits and lower gestational age than the Icelandic women and were less often diagnosed with hypertensive disorder and symphysis pubis dysfunction. The migrant primiparous women were older than the Icelandic women and less often diagnosed with obesity (Table 1), and the migrant multiparous women had lower parity, less often gave birth in a primary birth facility and more often had undergone a previous cesarean section (Table 2). Overall, the migrant women with missing citizenship were older, more often married/cohabiting and had fewer antenatal care visits than the Icelandic women. The migrant primiparous women with missing citizenship were less often diagnosed with hypertensive disorder, and the migrant multiparous women with missing citizenship less often gave birth in a primary or secondary birth facility and more often gave birth in a tertiary birth facility.

Overall, the migrant women had higher adjusted ORs (aORs) of instrumental birth and episiotomy and lower aORs of induction of labor than the Icelandic women (Tables 3 and 4). Additionally, the migrant multiparous women overall had higher aORs of emergency cesarean section and perineum support, and lower aORs of epidural and elective cesarean section (Table 4).

The migrant primiparous women with missing citizenship had lower aORs of OASI (0.26, 95% CI 0.08–0.81) and preterm birth (0.33, 95% CI 0.13–0.85).

The migrant women in the lowest HDI group had higher aORs of emergency cesarean section and OASI (Tables 3 and 4), compared

with Icelandic women, and the multiparous women in the lowest HDI group also had higher aORs of instrumental birth and postpartum hemorrhage (Table 4). Tables 3 and 4 present the prevalence of crude and adjusted ORs with 95% confidence intervals (CI) for maternal and perinatal outcomes of primiparous and multiparous migrant women in HDI groups compared with Icelandic women.

4 | DISCUSSION

The results highlight the heterogeneous nature of migrant groups in Iceland, where migrant women from countries with an HDI score ≥ 0.900 had similar or better outcomes than women with Icelandic citizenship, whereas migrant women from countries with an HDI score lower than that of Iceland (< 0.900) had increased odds for several maternal and perinatal complications and interventions, such as emergency cesarean and postpartum hemorrhage.

This study is the first of its kind in Iceland. Its main strength is the use of registry-based population data over more than two decades. Given the prospectively and independently collected information, our study is likely to have minimal selection and information bias. Potential confounding was in part counteracted by adjusting for background characteristics in regression analysis and stratification by parity. Another strength is the large cohort size and the power to detect differences in rare outcomes.

Due to IMBR data registration on citizenship rather than country of origin, the reference group included migrant women who had received Icelandic citizenship (total 6983 women received Icelandic citizenship during the research period²⁶). Thus, the association with the outcome is likely biased towards the null value. Another limitation of the study is the missing data on citizenship and HDI classification for 350 migrant women, leading to a risk of distortion

TABLE 2 Background characteristics of multiparous women with foreign citizenship and Icelandic citizenship who gave birth to a singleton in Iceland between 1997 and 2018^a

| Characteristics | Multiparous women | | | | | | | | | | | |
|---------------------------|---------------------------------|------|---------------------------------|---------|--------------------------------------|---------|---|---------|---|---------|---------|---------|
| | Icelandic women (n = 51 190) | | All migrant women (n = 3757) | | Migrant women, HDI ≥0.9 (n = 954) | | Migrant women HDI 0.850 – 0.899 (n = 1748) | | Migrant women, HDI ≤0, 849 (n = 882) | | p value | |
| | % | % | % | p value | % | p value | % | p value | % | p value | % | p value |
| Maternal age at birth, yr | | | | | | | | | | | | |
| ≤19 | 0.3 | 0.3 | 0.3 | 0.126 | 0.3 | <0.001 | 0.3 | <0.001 | 0.3 | <0.001 | 0.3 | 0.525 |
| 20–24 | 8.8 | 8.8 | 8.2 | | 4 | | 8.8 | | 10.1 | | 10.1 | |
| 25–29 | 29.4 | 29.4 | 30.4 | | 24.3 | | 3.8 | | 29.1 | | 29.1 | |
| 30–34 | 36.4 | 36.3 | 37.6 | | 38.2 | | 37.6 | | 37.4 | | 37.4 | |
| 35–39 | 20.6 | 20.7 | 19.2 | | 26.4 | | 15.7 | | 19.4 | | 19.4 | |
| ≥40 | 4.5 | 4.5 | 4.3 | | 6.8 | | 3.2 | | 3.6 | | 3.6 | |
| Data missing | 0 | 0 | 0.2 | | 0 | | 0 | | 0 | | 0 | |
| Married/cohabiting | 49.9 | 49 | 63.1 | <0.001 | 54.7 | 0.001 | 66.4 | <0.001 | 82.8 | <0.001 | 82.8 | <0.001 |
| Data missing | 0.5 | 0.0 | 7.2 | | 5.0 | | 6.5 | | 9.8 | | 9.8 | |
| Capital area residence | 60.2 | 60.4 | 58.2 | 0.008 | 49 | <0.001 | 57.8 | 0.035 | 67 | <0.001 | 67 | <0.001 |
| Data missing | 2.1 | 2.1 | 3.6 | | 8.5 | | 0.7 | | 2.7 | | 2.7 | |
| Employed/student | 84.4 | 85.1 | 74.7 | <0.001 | 77.3 | <0.001 | 78.7 | <0.001 | 67.3 | <0.001 | 67.3 | <0.001 |
| Year of giving birth | | | | | | | | | | | | |
| 1997–2006 | 44.2 | 46 | 20.1 | <0.001 | 40.8 | 0.001 | 8.1 | <0.001 | 19.4 | <0.001 | 19.4 | <0.001 |
| 2007–2018 | 55.8 | 54 | 79.9 | | 59.2 | | 91.9 | | 80.6 | | 80.6 | |
| Data missing | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | |
| Parity | | | | | | | | | | | | |
| 1 | 57.2 | 56.2 | 71.8 | <0.001 | 62.3 | <0.001 | 78.1 | <0.001 | 70.3 | <0.001 | 70.3 | <0.001 |
| 2 | 31.5 | 32.3 | 20.6 | | 25.9 | | 16.5 | | 23.4 | | 23.4 | |
| ≥3 | 11.2 | 11.5 | 7.6 | | 11.8 | | 5.4 | | 6.3 | | 6.3 | |
| Data missing | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | |
| Previous cesarean section | 15.6 | 15.3 | 18.3 | <0.001 | 16.4 | <0.001 | 18.5 | <0.001 | 21.8 | <0.001 | 21.8 | <0.001 |
| Antenatal care visits | | | | | | | | | | | | |
| 0 | 0.2 | 0.2 | 0.8 | <0.001 | 1.2 | <0.001 | 0.6 | <0.001 | 0.8 | <0.001 | 0.8 | <0.001 |
| 1–3 | 0.6 | 0.5 | 2 | | 1.3 | | 1.5 | | 3.6 | | 3.6 | |
| 4–8 | 27.3 | 26.3 | 41.9 | | 25.4 | | 43.9 | | 43.9 | | 43.9 | |
| 9–11 | 44.2 | 44.6 | 39.3 | | 41.3 | | 40.6 | | 35.4 | | 35.4 | |
| ≥12 | 27.6 | 28.5 | 16.1 | | 20.9 | | 13.4 | | 16.3 | | 16.3 | |

(Continues)

TABLE 2 (Continued)

| Characteristics | Multiparous women | | | | | | | | | | | |
|-----------------------------|------------------------------|---------|------------------------------|---------|-----------------------------------|---------|--|---------|--------------------------------------|---------|--|--|
| | Icelandic women (n = 51 190) | | All migrant women (n = 3757) | | Migrant women, HDI ≥0.9 (n = 954) | | Migrant women HDI 0.850 – 0.899 (n = 1748) | | Migrant women, HDI ≤0, 849 (n = 882) | | | |
| | % | p value | % | p value | % | p value | % | p value | % | p value | | |
| Data missing | 0.3 | | 0.3 | | 0 | | 0.1 | | 0 | | | |
| Gestation | | <0.001 | | | | 0.116 | | <0.001 | | <0.001 | | |
| ≤36+6 w | 3.8 | | 4.9 | | 4.2 | | 4.9 | | 5.7 | | | |
| 37+0 to 41+6 w | 93.3 | | 93.6 | | 93.6 | | 93.9 | | 93 | | | |
| ≥42+0 w | 2.9 | | 1.5 | | 2.2 | | 1.2 | | 1.3 | | | |
| Data missing | 3.3 | | 3.2 | | 3.4 | | 2.9 | | 4.9 | | | |
| Level of birth services | | 0.012 | | | | 0.001 | | <0.001 | | <0.001 | | |
| Primary | 12.1 | | 11.1 | | 16.4 | | 10.5 | | 7.4 | | | |
| Secondary | 9 | | 10.1 | | 9 | | 12.9 | | 6.2 | | | |
| Tertiary | 78.9 | | 78.9 | | 74.6 | | 76.6 | | 86.4 | | | |
| Data missing | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| Comorbidity | | | | | | | | | | | | |
| Hypertensive disorder | 2.2 | | 1.6 | 0.004 | 1.2 | | 2.1 | 0.530 | 1 | 0.012 | | |
| Diabetes | 5.5 | | 7.9 | <0.001 | 5.1 | | 7.6 | <0.001 | 12.1 | <0.001 | | |
| HIV ^b | 0 | | 0.1 | 0.800 | 0 | | 0.1 | 0.067 | 0.2 | 0.020 | | |
| Hepatitis ^b | 0.2 | | 0.5 | <0.001 | 0.1 | | 0.5 | 0.028 | 1 | <0.001 | | |
| Symphysis pubis dysfunction | 3.1 | | 2 | <0.001 | 1.9 | | 1.8 | 0.001 | 2.4 | 0.188 | | |
| Thalassemia ^b | 0 | | 0.1 | 0.005 | 0 | | 0 | — | 0.2 | <0.001 | | |
| Obesity | 3.6 | | 3.2 | 0.144 | 2.9 | | 3.8 | 0.791 | 2.4 | 0.045 | | |

The p values for comparison of each group of migrant women with the group of Icelandic women, χ^2 .

Abbreviation: HDI, Human Development Index.

^aDenominators vary because of missing values. HDI: 173 migrant women missing.

^bIf Chi-square tests were not valid due to >20% cells having an expected count <5, the Fisher exact test was used.

TABLE 3 Prevalence (%) of, crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CI) for maternal and perinatal outcomes of primiparous women with foreign citizenship compared with women with Icelandic citizenship who gave birth to a singleton in Iceland between 1997 and 2018*

| | Primipara | | | | | | | | | | | | | | | | | | |
|---|-----------------------|---------|-----------------------|------------------------------------|---------|-----------------------|------------------------------|---------|-----------------------|--|---------|-----------------------|---|---------|-----------------------|---------------------------------|---------|-----------------------|--|
| | TOTAL (n = 37 456) | | | Icelandic women (n = 33 055) | | | All migrant women (n = 4401) | | | Migrant women, HDI ≥0.900 (n = 893) | | | Migrant women, HDI 0.850– 0.899 (n = 2327) | | | Migrant women, 4.401 (n = 1004) | | | |
| | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | |
| Childbirth intervention | | | | | | | | | | | | | | | | | | | |
| Induction of labor ^b | 20.9 | 21.4 | 1.03 (0.95–1.12) | 0.88 (0.79–0.98) | 18.4 | 0.86 (0.71–1.04) | 0.73 (0.58–0.90) | 22 | 1.07 (0.96–1.19) | 0.86 (0.75–1.00) | 22.8 | 1.12 (0.95–1.32) | 1.02 (0.84–1.25) | | | | | | |
| Amniotomy ^{c,d} | 31 | 30.5 | 0.97 (0.89–1.07) | 1.09 (0.95–1.24) | 25.8 | 0.81 (0.64–1.03) | 0.91 (0.69–1.19) | 31.8 | 1.04 (0.92–1.17) | 1.16 (0.98–1.36) | 28.6 | 0.89 (0.73–1.09) | 1.09 (0.85–1.39) | | | | | | |
| Oxytocin augmentation ^{c,d} | 33.6 | 35.6 | 1.11 (1.02–1.22) | 1.07 (0.94–1.22) | 29 | 0.82 (0.65–1.04) | 0.81 (0.62–1.06) | 36.2 | 1.14 (1.02–1.28) | 1.11 (0.94–1.30) | 39.5 | 1.31 (1.09–1.58) | 1.31 (1.04–1.66) | | | | | | |
| Epidural ^b | 50.6 | 50.3 | 0.99 (0.92–1.06) | 0.94 (0.86–1.02) | 40.7 | 0.67 (0.58–0.78) | 0.71 (0.60–0.84) | 52.8 | 1.09 (1.00–1.19) | 1.00 (0.89–1.12) | 52.5 | 1.08 (0.94–1.24) | 1.10 (0.93–1.29) | | | | | | |
| Perineum support ^{e,f} | 63.8 | 64.9 | 1.06 (0.95–1.19) | 1.10 (0.93–1.30) | 56.7 | 0.75 (0.58–0.97) | 0.78 (0.56–1.07) | 66.4 | 1.13 (0.98–1.30) | 0.79 (0.64–0.98) | 67.8 | 1.21 (0.95–1.53) | 1.15 (0.83–1.61) | | | | | | |
| Episiotomy ^{g,h} | 18.3 | 17.7 | 1.26 (1.14–1.39) | 1.20 (1.06–1.36) | 22 | 1.31 (1.06–1.63) | 1.16 (0.90–1.47) | 21.9 | 1.30 (1.16–1.47) | 1.29 (1.10–1.52) | 19.9 | 1.16 (0.95–1.41) | 1.09 (0.86–1.39) | | | | | | |
| Instrumental birth ^b | 15.1 | 17.1 | 1.19 (1.08–1.30) | 1.14 (1.02–1.27) | 16.8 | 1.16 (0.96–1.42) | 1.02 (0.82–1.26) | 16.6 | 1.15 (1.02–1.29) | 1.15 (0.98–1.34) | 18.2 | 1.29 (1.08–1.54) | 1.23 (1.00–1.51) | | | | | | |
| Elective cesarean section | 3.6 | 4.2 | 1.22 (1.04–1.43) | 1.09 (0.89–1.33) | 4.9 | 1.43 (1.05–1.95) | 1.14 (0.80–1.62) | 4.1 | 1.18 (0.95–1.46) | 1.18 (0.90–1.55) | 4.1 | 1.18 (0.86–1.62) | 0.87 (0.60–1.28) | | | | | | |
| Emergency cesarean section | 13.5 | 13.6 | 1.00 (0.91–1.11) | 1.04 (0.92–1.17) | 13.5 | 1.00 (0.81–1.24) | 0.87 (0.68–1.10) | 12.1 | 0.88 (0.77–1.01) | 0.96 (0.81–1.14) | 17.3 | 1.34 (1.11–1.60) | 1.43 (1.16–1.76) | | | | | | |
| Maternal outcomes | | | | | | | | | | | | | | | | | | | |
| OAS ^f | 8.9 | 7.4 | 0.81 (0.71–0.92) | 0.86 (0.74–1.01) | 8.8 | 0.97 (0.75–1.26) | 0.88 (0.67–1.17) | 6 | 0.64 (0.53–0.77) | 0.70 (0.55–0.89) | 10.7 | 1.20 (0.96–1.51) | 1.33 (1.02–1.72) | | | | | | |
| Postpartum hemorrhage | 7.0 | 8.5 | 1.28 (1.14–1.43) | 0.98 (0.85–1.14) | 7.6 | 1.13 (0.88–1.46) | 1.05 (0.79–1.38) | 8.6 | 1.30 (1.12–1.51) | 0.90 (0.74–1.09) | 9.2 | 1.39 (1.12–1.73) | 1.14 (0.88–1.47) | | | | | | |
| Neonatal Outcomes | | | | | | | | | | | | | | | | | | | |
| Preterm | 5.5 | 6.2 | 1.14 (0.99–1.30) | 0.56 (0.46–0.68) | 5.2 | 0.94 (0.69–1.28) | 0.44 (0.29–0.67) | 6 | 1.10 (0.92–1.32) | 0.75 (0.58–0.97) | 7 | 1.30 (1.01–1.67) | 0.44 (0.32–0.62) | | | | | | |
| 5-min Apgar <7 ^g | 3.1 | 2.5 | 0.77 (0.63–0.93) | 0.86 (0.68–1.09) | 2.2 | 0.69 (0.44–1.08) | 0.67 (0.40–1.11) | 2.5 | 0.78 (0.60–1.02) | 1.01 (0.73–1.39) | 2.6 | 0.80 (0.54–1.19) | 0.86 (0.55–1.35) | | | | | | |
| NICU admission ^{h,g} | 9 | 9 | 1.00 (0.86–1.17) | 1.08 (0.87–1.35) | 9.3 | 1.03 (0.72–1.49) | 1.34 (0.89–2.02) | 8.5 | 0.94 (0.77–1.14) | 1.03 (0.77–1.37) | 10.5 | 1.18 (0.87–1.58) | 1.07 (0.72–1.58) | | | | | | |

(Continues)

TABLE 3 (Continued)

| | | Primipara | | | | | | | | | |
|----------------------------------|-----|------------------------------|-----------------------|------------------------------|------------------|--------------------------------------|-----|---|-----------------------|---------------------------------|-----------------------|
| | | Icelandic women (n = 33 055) | | All migrant women (n = 4401) | | Migrant women, HDI ≥0, 900 (n = 893) | | Migrant women, HDI 0.850–0.899 (n = 2327) | | Migrant women, 4.401 (n = 1004) | |
| TOTAL (n = 37 456) | % | OR (CI) | aOR ^f (CI) | % | OR (CI) | aOR ^f (CI) | % | OR (CI) | aOR ^f (CI) | % | aOR ^f (CI) |
| Perinatal mortality ^b | 0.5 | 0.6 | 0.81 (0.41–1.61) | 0.3 | 0.74 (0.24–2.34) | 0.29 (0.04–2.30) | 0.5 | 1.15 (0.64–2.06) | 0.71 (0.25–2.05) | 1 | 2.22 (1.17–4.23) |
| | | 1.26 (0.82–1.93) | 0.81 (0.41–1.61) | 0.3 | 0.74 (0.24–2.34) | 0.29 (0.04–2.30) | 0.5 | 1.15 (0.64–2.06) | 0.71 (0.25–2.05) | 1 | 2.22 (1.17–4.23) |

Statistically significant findings for crude and adjusted ORs are marked in bold.

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; HDI, Human Development Index; NICU, Neonatal Intensive Care Unit; OASI, obstetric anal sphincter injury; OR, odds ratio.

^aDenominators vary because of missing values and exclusion criteria.

^bAmong women with planned vaginal birth (women excluded if they had an elective cesarean section).

^cAmong women with spontaneous onset of labor (women excluded if they had an elective cesarean section and an induction of labor).

^dRegistration began in the year 2006, total numbers 22 873 (Icelandic women: 19 206; all migrant women: 3665; highest HDI: 590; middle HDI: 2137; lowest HDI: 825).

^eRegistration began in the year 2012, total numbers 11 853 (Icelandic women: 9953; all migrant women: 1910; highest HDI: 295; middle: 1155; lowest HDI: 410).

^fAmong women with vaginal birth (women excluded if they had a cesarean section).

^gAmong live births (newborn excluded if stillborn).

^hIf Chi-square tests were not valid due to >20% cells having an expected count <5, the Fisher exact test was used.

ⁱAdjustments were made for age, gestational age (except for the variable preterm), number of antenatal visits, occupation, birth year, residence, marital status, level of birth services, hypertensive disorder, diabetes, HIV, hepatitis, obesity, thalassemia and symphysis pubis dysfunction.

TABLE 4 Prevalence (%) of, and crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CI) for maternal and perinatal outcome of multiparous women with foreign citizenship compared with women with Icelandic citizenship who gave birth to a singleton in Iceland between 1997 and 2018^a

| Multipara | | Icelandic women (n = 51 190) | | All migrant women (n = 3757) | | Migrant women, HDI ≥ 0, (n = 954) | | Migrant women, HDI 0.850–0.899 (n = 1748) | | Migrant women, HDI ≤ 0, 849 (n = 882) | | |
|--------------------------------------|------|------------------------------|------------------|------------------------------|------|-----------------------------------|-----------------------|---|------------------|---------------------------------------|------|--|
| | % | % | OR (CI) | aOR ^b (CI) | % | OR (CI) | aOR ^b (CI) | % | OR (CI) | aOR ^b (CI) | % | |
| Childbirth intervention | | | | | | | | | | | | |
| Induction of labor ^b | 18 | 18.2 | 0.85 (0.77–0.94) | 0.74 (0.66–0.83) | 14.5 | 0.77 (0.63–0.94) | 0.82 (0.66–1.02) | 16.5 | 0.89 (0.78–1.02) | 0.71 (0.61–0.83) | 16.2 | |
| Amniotomy ^{c,d} | 23.3 | 23.4 | 0.94 (0.84–1.04) | 1.05 (0.93–1.18) | 23.1 | 0.98 (0.78–1.24) | 1.10 (0.86–1.40) | 21.6 | 0.90 (0.78–1.04) | 0.99 (0.85–1.16) | 22.4 | |
| Oxytocin augmentation ^{c,d} | 12.9 | 12.8 | 1.11 (0.97–1.26) | 1.14 (0.99–1.32) | 14.4 | 1.14 (0.86–1.52) | 1.03 (0.79–1.48) | 13.9 | 1.10 (0.93–1.30) | 1.16 (0.96–1.41) | 13.1 | |
| Epidural ^b | 25.4 | 25.3 | 1.12 (1.03–1.21) | 0.91 (0.83–1.00) | 23.1 | 0.89 (0.75–1.05) | 0.88 (0.73–1.06) | 30.2 | 1.28 (1.15–1.43) | 0.98 (0.86–1.11) | 26.8 | |
| Perineum support ^{e,f} | 56.9 | 56.4 | 1.24 (1.12–1.38) | 1.39 (1.21–1.60) | 50.6 | 0.79 (0.62–1.01) | 0.97 (0.72–1.32) | 59.6 | 1.14 (1.00–1.31) | 0.73 (0.61–0.87) | 74 | |
| Episiotomy ^{d,f} | 3.9 | 3.7 | 1.41 (1.18–1.70) | 1.29 (1.05–1.59) | 5.3 | 1.45 (1.00–2.14) | 1.16 (0.76–1.77) | 5.4 | 1.47 (1.15–1.87) | 1.35 (1.03–1.76) | 5.4 | |
| Instrumental birth ^b | 3.3 | 3.2 | 1.45 (1.22–1.73) | 1.41 (1.16–1.72) | 4.6 | 1.46 (1.04–2.05) | 1.30 (0.90–1.88) | 4.7 | 1.51 (1.19–1.93) | 1.48 (1.14–1.94) | 4.8 | |
| Elective cesarean section | 8.8 | 8.9 | 0.91 (0.81–1.03) | 0.67 (0.57–0.78) | 7.9 | 0.88 (0.69–1.11) | 0.69 (0.51–0.92) | 7.8 | 0.87 (0.73–1.04) | 0.68 (0.55–0.84) | 9.5 | |
| Emergency cesarean section | 6.4 | 6.2 | 1.36 (1.19–1.56) | 1.32 (1.12–1.55) | 7 | 1.13 (0.85–1.49) | 1.05 (0.76–1.44) | 7.9 | 1.30 (1.07–1.57) | 1.31 (1.04–1.64) | 11.1 | |
| Maternal outcomes | | | | | | | | | | | | |
| OAS ^f | 2.4 | 2.4 | 1.07 (0.85–1.34) | 0.92 (0.70–1.20) | 2 | 0.83 (0.51–1.37) | 0.61 (0.34–1.08) | 2.2 | 0.92 (0.64–1.31) | 0.83 (0.56–1.23) | 4.1 | |
| Postpartum hemorrhage | 4.7 | 4.5 | 1.41 (1.23–1.62) | 1.09 (0.94–1.27) | 4.4 | 0.97 (0.71–1.32) | 0.94 (0.68–1.32) | 6.3 | 1.41 (1.16–1.72) | 0.97 (0.79–1.19) | 7.9 | |
| Neonatal outcomes | | | | | | | | | | | | |
| Preterm | 3.8 | 3.7 | 1.36 (1.16–1.59) | 1.04 (0.87–1.25) | 4.2 | 1.15 (0.83–1.59) | 0.82 (0.57–1.19) | 4.9 | 1.36 (1.08–1.70) | 1.19 (0.92–1.53) | 5.7 | |
| 5-min Apgar <7 ^g | 1.7 | 1.7 | 0.70 (0.52–0.94) | 0.75 (0.54–1.04) | 1.1 | 0.61 (0.33–1.14) | 0.64 (0.33–1.24) | 1.3 | 0.73 (0.48–1.12) | 0.82 (0.52–1.31) | 1 | |

(Continues)

TABLE 4 (Continued)

| Multipara | | Icelandic women (n = 51 190) | | All migrant women (n = 3757) | | Migrant women, HDI ≥ 0, 9 (n = 954) | | Migrant women, HDI 0.850–0.899 (n = 1748) | | Migrant women, HDI ≤ 0, 849 (n = 882) | |
|----------------------------------|-----|------------------------------|------------------|------------------------------|-----|-------------------------------------|-----------------------|---|------------------|---------------------------------------|-----|
| | % | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % | OR (CI) | aOR [†] (CI) | % |
| NICU admission ^{d,g} | 4.5 | 4.5 | 1.02 (0.82–1.26) | 0.90 (0.70–1.16) | 3.5 | 0.77 (0.45–1.32) | 0.87 (0.49–1.53) | 4.3 | 0.95 (0.71–1.27) | 0.85 (0.60–1.21) | 6.2 |
| Perinatal mortality ^h | 0.4 | 0.4 | 1.03 (0.60–1.77) | 1.05 (0.54–2.04) | 0.5 | 1.45 (0.59–3.52) | 1.54 (0.55–4.34) | 0.2 | 0.63 (0.23–1.70) | 0.47 (0.13–1.73) | 0.5 |

Statistically significant findings for crude and adjusted ORs are marked in bold.

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; HDI, Human Development Index; NICU, Neonatal Intensive Care Unit; OASI, obstetric anal sphincter injury; OR, odds ratio.

^a Denominators vary because of missing values and exclusion criteria.

^b Among women with planned vaginal birth (women excluded if they had an elective cesarean section).

^c Among women with spontaneous onset of labor (women excluded if they had an elective cesarean section and an induction of labor).

^d Registration begun in 2006, total numbers 33 167 (Icelandic women: 30 034; all migrant women: 3133; highest HDI: 608; middle HDI: 1650; lowest HDI: 748).

^e Registration begun in 2012, total numbers 16 828 (Icelandic women: 14 952; all migrant women: 1876; highest HDI: 304; middle HDI: 1106; lowest HDI: 416).

^f Among women with vaginal birth (women excluded if they had a cesarean section).

^g Among live births (newborn excluded if stillborn).

^h If Chi-square tests were not valid due to >20% cells having an expected count <5, the Fisher exact test was used.

[†] Adjustments were made for age, parity, gestational age (except for the variable preterm), number of antenatal visits, occupation, birth year, residence, marital status, level of birth services, hypertensive disorder, diabetes, HIV, hepatitis, thalassaemia, obesity, symphysis pubis dysfunction and previous cesarean section.

related to exposure. It is unknown to which group they belong or the reason for the missing data. Combining different origins within the HDI groups may obscure the differences among the ethnic groups. Additionally, we based part of the analysis on the 2018 HDI, but the evolution of the index over the research period could have impacted the migrant women's classification. This limitation, the lack of information on their reason for migrating and socioeconomic variables, such as education, length of residence and onset of first antenatal visit, prevent a more accurate identification of women likely to be the most vulnerable and the ability to discover insights into their associated outcomes. These weaknesses in the data registration provide an opportunity for improvement in ways to benefit maternity care.

Previous studies on the risk of adverse maternal and perinatal outcomes in migrant women compared with women in the host country have shown inconsistent results, with heterogeneity in study designs and definitions of exposure groups. The Icelandic migrant group of women differs from those of other Nordic countries regarding country of origin/citizenship and reason for migration.²⁷ This allows a limited comparison of results with previous studies from other Nordic countries, despite other similarities in culture and health.

Comparing the most prominent results, we saw a great variety of similarities and differences. For example, for instrumental birth, similar results were found in a Norwegian study.¹⁰ However, a Finnish study⁷ showed different results with similar prevalence among migrant and Finnish women. Our findings of a higher aOR for emergency cesarean section aligned with Swedish,¹³ Norwegian⁸ and Finnish studies¹² regarding migrant women in our lowest HDI group. Another Norwegian study²⁸ showed a higher risk of emergency and elective cesarean section for all groups of migrant women except Vietnamese, which partially aligned with our result.

The reasons for an instrumental birth can vary, from maternal exhaustion or medical indications to a prolonged second stage of labor or fetal compromise.²⁹ We analyzed the prevalence of fetal compromise (ICD-10: O68.0–3), which was higher among all primiparous migrant women, the middle HDI group and the lowest HDI group. This may partially explain higher instrumental birth rates among primiparous migrant women overall but not among multiparous migrant women.

One could speculate that differences in mode of birth may be due to fetopelvic disproportion,³⁰ but when measuring its prevalence in this study (ICD-10: O65.4), only migrant women in the lowest HDI group had a higher prevalence of fetopelvic disproportion than Icelandic women, which does not explain the higher aOR for instrumental birth and emergency cesarean section among multiparous migrant women in the middle HDI group. Body mass index, problems in communication/language or other known risk factors³⁰ could explain our results but these were not measured in our study.

Our findings on higher odds of episiotomy for overall and middle HDI group migrant women were not aligned with a Norwegian study.¹⁰ We did a sub-analysis to determine whether instrumental birth explains the higher episiotomy and OASI odds among

migrant women and found that it did affect the outcome for the migrant women in the lowest HDI group, for both primiparous and multiparous women but had no effect on the odds for the other migrant groups. Our results on postpartum hemorrhage were partially aligned with two Norwegian studies^{8,10} but not with a Swedish study.¹¹

Our results on neonatal outcomes among migrant primiparous women overall possibly suggest a later start of antenatal care among migrant women; however, despite their lower gestational age and fewer antenatal care visits compared with Icelandic women, we do not know when their first visit took place or how long they stayed in the country. Additionally, by using the HDI index as a social determinant of perinatal and maternal health, the differences in outcomes between exposed and unexposed women demonstrate underlying inequalities that might interfere with antenatal and perinatal care. The regulation on health insurance for migrants during their first 6 months in Iceland can furthermore affect access to care (eg fewer antenatal visits, less use of epidurals and fewer labor inductions). Notably, we have no information on the need for or the use of interpreters in maternity care.

There is a certain disadvantage to comparing migrants with a host population because it is difficult to ascertain whether migration itself improves or worsens health.¹⁷ In our study, the effect of socioeconomic status could only be partially modeled, but when adjusted for the available variables of social status and underlying health conditions of the mother, the result indicated persistent disadvantages for most groups of migrant women, suggesting that other factors (eg access^{6,22} to and quality of care⁶) might also be significant factors.

5 | CONCLUSION

Our results demonstrate that after adjusting for potential confounding variables, a significant association persisted between a range of maternal and perinatal complications/interventions and women's citizenship as well as the HDI score of their country of citizenship. Migrant women overall had higher aORs of episiotomy and instrumental births and lower aORs of induction of labor compared with Icelandic women. The findings encourage a further look into inequality in healthcare in Iceland, a country that emphasizes equal access to healthcare as a key aim in its healthcare policy. Furthermore, this study indicates an urgent need to improve data collection on maternity care by including migrant health outcomes that are more closely aligned with their needs. Future research needs to focus on the possible predictors of different outcomes, the provision of perinatal care and its effect on perinatal outcomes and the experiences of migrant women in Iceland in order to develop personalized and culturally sensitive antenatal and perinatal care for all women in the country.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

EÝG drafted the manuscript and analyzed the data, and each all authors substantially contributed to the study design, data interpretation and revising of this manuscript.

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REFERENCES

- World Health Organization. Report on the health of refugees and migrants in the WHO European Region: No public health without refugee and migrant health. 2018. WHO/Europe | Publications—Report on the health of refugees and migrants in the WHO European Region: no public health without refugee and migrant health. 2018.
- Statistics Iceland. The numbers of immigrants continue to increase. 2019. Available from: https://hagstofa.is/utgafur/frettasafn/mannfjoldi/innflytjendur/?fbclid=IwAR0RrgMnmVWskIBR4F_L6cPwipf3EU3_JvxXzeOpA7nqDuDIYGrDYI_H74
- Statistics Norway. 14 percent of population are immigrants. 2018. Available from: <https://www.ssb.no/en/befolkning/artikler-og-publikasjoner/14-per-cent-of-population-are-immigrants>
- Statistics Denmark. Immigrants and their descendants. Available from: <https://www.dst.dk/en/Statistik/emner/befolkning-og-valg/indvandrere-og-efterkommere>
- International Organization for Migration (IOM). The UN Migration Agency. World migration report. IOM, 2017. Geneva: IOM; 2018.
- Essén B, Bødker B, Sjöberg NO, et al. Are some perinatal deaths in immigrant groups linked to suboptimal perinatal care services? *BJOG*. 2002;109:677-682.
- Malin M, Gissler M. Maternal care and birth outcomes among ethnic minority women in Finland. *BMC Public Health*. 2009;9:84.
- Mæland KS, Sande RK, Bing-Jonsson PC. Risk for delivery complications in Robson Group 1 for non-Western women in Norway compared with ethnic Norwegian women—A population-based observational cohort study. *Sex Reprod Healthcare*. 2019;20:42-45.
- Vik ES, Aasheim V, Schytt E, Small R, Moster D, Nilsen RM. Stillbirth in relation to maternal country of birth and other migration related factors: a population-based study in Norway. *BMC Pregnancy Childbirth*. 2019;19:5.
- Bakken KS, Skjeldal OH, Stray-Pedersen B. Higher risk for adverse obstetric outcomes among immigrants of African and Asian descent: a comparison study at a low-risk maternity hospital in Norway. *Birth*. 2015;42:132-140.
- Liu C, Ahlberg M, Hjern A, Stephansson O. Perinatal health of refugee and asylum-seeking women in Sweden 2014–17: a register-based cohort study. *Eur J Public Health*. 2019;29:1048-1055.
- Bastola K, Koponen P, Gissler M, Kinnunen TI. Differences in caesarean delivery and neonatal outcomes among women of migrant origin in Finland: a population-based study. *Paediatr Perinat Epidemiol*. 2020;34:12-20.
- Juárez SP, Small R, Hjern A, Schytt E. Caesarean birth is associated with both maternal and paternal origin in immigrants in Sweden: a population-based study. *Paediatr Perinat Epidemiol*. 2017;31:509-521.
- Juárez SP, Revuelta-Eugercios BA. Exploring the “Healthy Migrant Paradox” in Sweden. A cross sectional study focused on perinatal outcomes. *J Immigrant Minority Health*. 2016;18:42-50.
- Bastola K, Koponen P, Härkänen T, Luoto R, Gissler M, Kinnunen TI. Delivery and its complications among women of Somali, Kurdish, and Russian origin, and women in the general population in Finland. *Birth*. 2019;46:35-41.
- Huddleston T, Bilgili Ö, Joki A-L, Vankova Z. *Migrant Integration Policy Index 2015*. Barcelona/Brussels: CIDOB/MPG; 2015.
- Abubakar I, Aldridge RW, Devakumar D, et al. The UCL–Lancet Commission on Migration and Health: the health of a world on the move. *Lancet*. 2018;392:2606-2654.
- Statistics Iceland. Special edition on immigrants in Iceland. 2019. Available from: <http://hagstofan.s3.amazonaws.com/media/public/2019/901e98bb-a182-4dc1-9059-261b7bea719b.pdf>
- Government of Iceland, Ministry of Welfare. Immigrants in Iceland. 2009. Available from: https://www.stjornarradii.is/media/velferdrarraduneyti-media/media/acrobat-skjol/Innflytjendur_skyrsIaOkt2009.pdf
- Statistics Iceland. Number of employed persons, years, sex, age and background 2008-2018. Available from: https://px.hagstofa.is/pxis/pxweb/is/Samfelag/Samfelag_vinumarkadur_vinnuafskraargogn/VIN10020.px
- Conceição P. Beyond Income, Beyond Averages, beyond Today: Inequalities in Human Development in the 21st Century. Human Development Report. 2019. UNDP; New York; 2019.
- Bollini P, Pampallona S, Wanner P, Kupelnick B. Pregnancy outcome of migrant women and integration policy: a systematic review of the international literature. *Soc Sci Med*. 2009;68:452-461.
- Icelandic Health Insurance. Health insurance in Iceland, interpreter service. Available from: <https://www.sjukra.is/english/social-insurance-in-iceland/interpreter-service/>
- Nordic Centre for Classifications in Health Care. NOMESCO Classification of Surgical Procedures (NCSP), version 1.15.
- Statistics Iceland. Immigrants and persons with foreign background 1996–2008. Statistical Series. 2009;94:1-24.
- Government of Iceland, Ministry of Justice. Icelandic Nationality Act, No. 100/1952. 2017. Available from: <https://www.government.is/Publications/Legislation/Lex/?newsid=bc41955e-e63a-11e7-9423-005056bc530c>
- Karlsdóttir A, Rispling L, Norlén G, et al. State of the Nordic Region 2018: Immigration and Integration Edition. Copenhagen: Nordic Council of Ministers; 2018.
- Vangen S, Stoltenberg C, Skrandal A, Magnus P, Stray-Pedersen B. Cesarean section among immigrants in Norway. *Acta Obstet Gynecol Scand*. 2000;79:553-558.
- American College of Obstetricians and Gynecologists. Operative vaginal birth: ACOG practice bulletin, number 219. *Obstet Gynecol*. 2020;135:e149-e159.
- Merry L, Small R, Blondel B, Gagnon AJ. International migration and caesarean birth: a systematic review and meta-analysis. *BMC Pregnancy Childbirth*. 2013;13:27.

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Paper II

Use of pain management in childbirth among migrant women in Iceland: A population-based cohort study

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Abstract

Background: Immigration is rapidly increasing in Iceland with 13.6% of the population holding foreign citizenship in 2020. Earlier findings identified inequities in childbirth care for some women in Iceland. To gain insight into the quality of intrapartum midwifery care, migrant women's use of pain management methods during birth in Iceland was explored.

Methods: A population-based cohort study including all women with a singleton birth in Iceland between 2007 and 2018, in total 48 173 births. Logistic regression analyses with odds ratios (ORs) and 95% confidence intervals (CIs) were used to investigate the relationship between migrant backgrounds defined as holding foreign citizenship and the use of pain management during birth. The main outcome measures were use of nonpharmacological and pharmacological pain management methods.

Results: Data from 6097 migrant women were included. Migrant women had higher adjusted OR (aORs) for no use of pain management (aOR = 1.23 95% CI [1.12, 1.34]), when compared to Icelandic women. Migrant women also had lower aORs for the use of acupuncture (0.73 [0.64, 0.83]), transcutaneous electrical nerve stimulation (TENS) (0.92 [0.01, 0.67]), shower/bath (0.73 [0.66, 0.82]), aromatherapy (0.59 [0.44, 0.78]), and nitrous oxide inhalation (0.89 [0.83, 0.96]). Human Development Index (HDI) scores of countries of citizenship <0.900 were associated with lower aORs for the use of various pain management methods.

Conclusions: Our results suggest that being a migrant in Iceland is an important factor that limits the use of nonpharmacological pain management, especially for migrant women with citizenship from countries with HDI score <0.900.

KEYWORDS

complementary therapies, labor pain, midwifery, migrants, pain management

1 | INTRODUCTION

A swift change in Iceland's population composition during the last decades calls for a health system that nurtures the needs of a more diverse group of childbearing women. The proportion of migrant childbearing women in Iceland increased from 4.1% on average during 1997-2006 to a 12.5% on average during 2007-2018¹ with most women coming from Poland (34.1%), the Philippines (5.8%), and Lithuania (5%).² Results of a recent Icelandic research study¹ point toward migrant childbearing women being disadvantaged with respect to a range of maternal and perinatal complications and interventions. The results suggest that factors such as access interfere with quality of midwifery care and might exacerbate inequity in health care.¹

Intrapartum midwifery care is one of the key factors that contributes to quality of care and a woman's positive childbirth experience.³ Promoting comfort is an integral part of the "art" of midwifery care.⁴ Therefore, all birthing people are entitled to receive evidence-based information on both pharmacological and nonpharmacological methods of pain relief so they can make informed choices about intrapartum care fitting their personal needs. Nonpharmacological pain management methods are beneficial on many levels. They enhance women's satisfaction with care, their feelings of competence and control in labor,⁵ their feeling of coping with pain,⁶ and reduce the need for obstetric interventions.⁵ However, this may not be sufficient for all women who experience suffering because of the pain, increasing the risk of obstetric interventions.⁶ Understanding circumstances where pharmacological pain management should be offered is, therefore, also critical.

There are indications about the possible relationship between use of pain management methods in labor such as epidural and the quality of maternity services.⁷ Increased use of pharmacological pain management methods among laboring women has been connected to primiparity,⁸ macrosomia,⁹ higher BMI,^{9,10} maternal stature (high birthweight among short women),¹⁰ advanced maternal age⁹ and income,⁸ permanent employment,⁸ being married,⁸ not being a migrant,^{7,10-16} longer stay in the receiving country,¹⁰ induction of labor,¹⁷ lack of one on one continuous support,¹⁸ participation of antenatal education programs,^{19,20} higher number of antenatal care visits,¹¹ cultural preference,²¹ and woman's health, such as anxiety, preeclampsia,⁸ and diabetes.²² Increased use of nonpharmacological pain management methods has been connected to primiparity,⁸ higher levels of education,¹¹ and not being a migrant.¹⁶

In addition, place of birth⁸ is a variable associated with the use of pain management methods. Use of pain management methods varies between groups of women with

different cultural backgrounds, but there is inconsistent information indicating that migrant women use either more or less pharmacological^{7,10,12-16,23,24} or nonpharmacological methods^{11,16,24} than their host population. Despite increased global attention to migrant women's health during childbirth, and to inequities in quality of care and access to maternity services for this group,²⁵ limited studies have been conducted on the use of various pain management methods in labor among migrant women. Thus, the aim of this study was to describe migrant women's utilization of pain management methods offered in intrapartum maternity care. We aimed to answer the question: "Does the use of pain management methods in childbirth in Iceland differ by citizenship?" The overall goal is to improve intrapartum care for migrant women in Iceland.

2 | METHODS

2.1 | Setting

The Icelandic maternity service is publicly funded and free for all residents, except for migrants relocating to Iceland from outside the European Economic Area (EEA), during their first 6 months in the country. Then, they automatically become a member of the Icelandic social insurance system, regardless of nationality. Iceland does not offer a national continuity of care model and women in labor generally do not know their midwife beforehand, however, continuous support from a midwife is promoted in labor. Usually, midwives provide information on pain management methods during antenatal care visits and in antenatal education programs. Women must pay for attending such programs but can apply for reimbursement from their trade union. Migrant women are entitled to free interpreter services in maternity care, although how often these are needed and used is unknown. All birth places in Iceland offer various nonpharmacological pain management methods during labor, some primary birth places additionally offer nitrous oxide inhalation, and some secondary and all tertiary birth settings offer all nonpharmacological and pharmacological pain management methods mentioned in this study. The pain management methods are free for all women with Icelandic health insurance. The Icelandic setting is further described in an earlier publication.²⁶

2.2 | Participants

The population in this cohort study included all women who gave birth to a singleton newborn in Iceland from January 1, 2007, to December 31, 2018. The data were

TABLE 1 Demographic and birth-related characteristics among birthing women with foreign citizenship and Icelandic citizenship who gave birth to a singleton in Iceland during the study period 2007-2018

| Characteristics | | TOTAL (n = 48 173) | Icelandic women (n = 42 076) | All migrant women (n = 6097) |
|--|-----------|-------------------------------|---|---|
| Maternal age at birth | mean (SD) | 29.23 (5.41) | 29.26 (5.47) | 29.08 (4.96) |
| ≤19 | n (%) | 1297 (2.7) | 1200 (2.9) | 97 (1.6) |
| 20-24 | n (%) | 8342 (17.3) | 7343 (17.5) | 999 (16.4) |
| 25-29 | n (%) | 16 181 (33.6) | 13 890 (33) | 2291 (37.6) |
| 30-34 | n (%) | 13 787 (28.6) | 11 951 (28.4) | 1836 (30.1) |
| 35-39 | n (%) | 7057 (14.6) | 6329 (15) | 728 (11.9) |
| ≥40 | n (%) | 1509 (3.1) | 1363 (3.2) | 146 (2.4) |
| Data missing | n (%) | 0 (0) | 0 (0) | 0 (0) |
| Parity | Mean (SD) | 0.87 (0.90) | 0.91 (0.92) | 0.60 (0.77) |
| 0 | n (%) | 20 340 (42.2) | 17 001 (40.4) | 3339 (54.8) |
| 1 | n (%) | 16 377 (34) | 14 319 (34) | 2058 (33.8) |
| 2 | n (%) | 8679 (18) | 8158 (19.4) | 521 (8.5) |
| ≥3 | n (%) | 2777 (5.8) | 2598 (6.2) | 179 (2.9) |
| Data missing | n (%) | 0 (0) | 0 (0) | 0 (0) |
| Married/cohabiting | n (%) | 14 984 (31.9) | 11 755 (28) | 3229 (65) |
| Data missing | n (%) | 1164 (2.4) | 35 (0.1) | 1129 (19.5) |
| Capital area residence | n (%) | 31 767 (65.9) | 27 835 (66.2) | 3932 (64.5) |
| Data missing | n (%) | 0 (0) | 0 (0) | 0 (0) |
| Employed/student | n (%) | 42 879 (89) | 37 950 (90.2) | 4929 (80.8) |
| Antenatal care visits | Mean (SD) | 9.65 (2.72) | 9.73 (2.72) | 9.10 (2.64) |
| 0 | n (%) | 133 (0.3) | 100 (0.2) | 33 (0.5) |
| 1-3 | n (%) | 328 (0.7) | 239 (0.6) | 89 (1.5) |
| 4-8 | n (%) | 15 767 (32.7) | 13 397 (31.8) | 2370 (38.9) |
| 9-11 | n (%) | 22 456 (46.6) | 19 736 (46.9) | 2720 (44.6) |
| ≥12 | n (%) | 9477 (19.7) | 8594 (20.4) | 883 (14.5) |
| Data missing | n (%) | 12 (0) | 10 (0) | 2 (0) |
| Induction of labor | n (%) | 11 207 (25.1) | 10 021 (25.7) | 1186 (20.8) |
| Data missing | n (%) | 3470 (7.2) | 3083 (7.3) | 387 (6.3) |
| Augmentation of labor | n (%) | 13 058 (38.7) | 11 195 (38.4) | 1863 (41) |
| Data missing | n (%) | 14 461 (30) | 12 907 (30.7) | 1554 (25.5) |
| Prolonged first stage of labor | n (%) | 1548 (3.2) | 1311 (3.1) | 237 (3.9) |
| Prolonged second stage of labor | n (%) | 2097 (4.4) | 1708 (4.1) | 389 (6.4) |
| High birthweight (macrosomia) (≥4.000 g) | n (%) | 12 278 (25.5) | 11 289 (26.8) | 989 (16.2) |
| Data missing | n (%) | 0 (0) | 0 (0) | 0 (0) |
| Place of birth | | | | |
| Primary | n (%) | 4229 (8.8) | 3722 (8.8) | 507 (8.3) |
| Secondary | n (%) | 4488 (9.3) | 3929 (9.3) | 559 (9.2) |
| Tertiary | n (%) | 39 456 (81.9) | 34 425 (81.8) | 5031 (82.5) |
| Data missing | n (%) | 0 (0) | 0 (0) | 0 (0) |
| Co-morbidity | | | | |
| Hypertensive disorder | n (%) | 1765 (3.7) | 1629 (3.9) | 136 (2.2) |
| Diabetes | n (%) | 3307 (6.9) | 2861 (6.8) | 446 (7.3) |

Note: *P*-values are for comparison of each group of migrant women with the group of Icelandic women, χ^2 . The bold italic values was to define the significance *P*-values < .05.

Denominators vary because of missing values. HDI: 211 migrant women missing.

| <i>P</i> value | Migrant women, HDI ≥0.900 (n = 1028) | <i>P</i> value | Migrant women, HDI 0.850-0.899 (n = 3482) | <i>P</i> value | Migrant women, HDI ≤0.849 (n = 1376) | <i>P</i> value |
|------------------|--------------------------------------|------------------|---|------------------|--------------------------------------|------------------|
| 0.021 | 31.32 (4.94) | <0.001 | 28.33 (4.73) | <0.001 | 29.36 (4.98) | 0.504 |
| <0.001 | 6 (0.6) | <0.001 | 68 (2) | <0.001 | 20 (1.5) | <0.001 |
| | 72 (7) | | 673 (19.3) | | 206 (15) | |
| | 304 (29.6) | | 1416 (40.7) | | 504 (36.6) | |
| | 383 (37.3) | | 962 (27.6) | | 429 (31.2) | |
| | 209 (20.3) | | 309 (8.9) | | 183 (13.3) | |
| | 54 (5.3) | | 54 (1.6) | | 34 (2.5) | |
| | 0 (0) | | 0 (0) | | 0 (0) | |
| <0.001 | 0.73 (0.87) | <0.001 | 0.54 (0.72) | <0.001 | 0.63 (0.78) | <0.001 |
| <0.001 | 507 (49.3) | <0.001 | 2002 (57.5) | <0.001 | 731 (53.1) | <0.001 |
| | 344 (33.5) | | 1167 (33.5) | | 465 (33.8) | |
| | 123 (12) | | 236 (6.8) | | 142 (10.3) | |
| | 54 (5.3) | | 77 (2.2) | | 38 (2.8) | |
| | 0 (0) | | 0 (0) | | 0 (0) | |
| <0.001 | 402 (42.4) | <0.001 | 1672 (63.2) | <0.001 | 1003 (83.8) | <0.001 |
| | 79 (7.7) | | 838 (24) | | 179 (13) | |
| 0.010 | 629 (61.2) | 0.001 | 2147 (61.7) | <0.001 | 998 (72.5) | <0.001 |
| | 0 (0) | | 0 (0) | | 0 (0) | |
| <0.001 | 895 (87.1) | 0.001 | 2928 (84.1) | <0.001 | 980 (71.2) | <0.001 |
| <0.001 | 9.06 (2.61) | <0.001 | 9.31 (2.54) | <0.001 | 8.72 (2.80) | <0.001 |
| <0.001 | 7 (0.7) | <0.001 | 15 (0.4) | <0.001 | 8 (0.6) | <0.001 |
| | 12 (1.2) | | 33 (0.9) | | 37 (2.7) | |
| | 404 (39.3) | | 1268 (36.4) | | 595 (43.3) | |
| | 447 (43.5) | | 1631 (46.9) | | 568 (41.3) | |
| | 158 (15.4) | | 423 (15.3) | | 167 (12.1) | |
| | 0 (0) | | 1 (0) | | 1 (0) | |
| <0.001 | 186 (19.8) | <0.001 | 678 (20.3) | <0.001 | 284 (22.6) | 0.014 |
| | 88 (8.6) | | 147 (4.2) | | 120 (8.7) | |
| <0.001 | 278 (36.7) | 0.341 | 1127 (42.3) | <0.001 | 397 (40.7) | 0.140 |
| | 270 (26.3) | | 815 (23.4) | | 401 (29.1) | |
| 0.001 | 39 (3.8) | 0.218 | 118 (3.4) | 0.374 | 72 (5.2) | <0.001 |
| <0.001 | 63 (6.1) | 0.001 | 221 (6.3) | <0.001 | 94 (6.8) | <0.001 |
| <0.001 | 204 (19.8) | <0.001 | 579 (16.6) | <0.001 | 168 (12.2) | <0.001 |
| | 0 (0) | | 0 (0) | | 0 (0) | |
| 0.335 | 118 (11.5) | 0.011 | 294 (8.4) | 0.025 | 81 (5.9) | <0.001 |
| | 100 (9.7) | | 373 (10.7) | | 76 (5.5) | |
| | 810 (78.8) | | 2815 (80.8) | | 1219 (88.6) | |
| | 0 (0) | | 0 (0) | | 0 (0) | |
| <0.001 | 21 (2) | 0.003 | 94 (2.7) | <0.001 | 17 (1.2) | <0.001 |
| 0.137 | 54 (5.3) | 0.051 | 213 (6.1) | 0.123 | 169 (12.3) | <0.001 |

prospectively collected via the Icelandic Medical Birth Registry (IMBR), a routinely collected, nationwide, centralized administrative registry. The IMBR includes data on all births in Iceland from 22⁺⁰ weeks' gestation on or for infants weighing ≥ 500 g, with a total 51 791 singleton births during the study period. We excluded elective cesarean births during the study period ($n = 3618$), leaving 48 173 births in the study.

2.3 | Measures

Data on migration status, maternal characteristics, birth characteristics, and pain management methods were obtained from the IMBR registry. Obstetric interventions, pain management methods, and birth complications were registered using: (a) the recorded variables, diagnostic and surgical codes in the IMBR; (b) International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10); (c) Nursing Interventions Classification (NIC); (d) Anatomical Therapeutic Chemical (ATC) Classification; and (e) Classification of Surgical Procedures (NCSP), according to the recommendation of the Nordic Medico-Statistical Committee (NOMESCO).¹⁸ The ascertainment for all pain management methods is presented in Table S1.

2.3.1 | Exposure variable

The exposure variable was both a dichotomous categorical variable and a polytomous categorical variable based on registered citizenship. The dichotomous variable "migrant women" was defined as women holding other citizenship than Icelandic, including refugees and asylum seekers. The polytomous categorical variable was based on the Human Development Index (HDI), described in more details in previous research.¹ HDI scores were categorized by IMBR in 12 groups with increments of 0.050. Because of the small number of migrants in Iceland coming from countries with low HDI, we combined the groups in the lower levels based on the number of migrants in each of the twelve categories. The lowest ten categories, including countries such as Thailand, Philippines, Pakistan, Afghanistan, and Sudan, merged into a group with HDI score ≤ 0.849 . The second group (HDI 0.850-0.899) included countries such as Poland, Lithuania, Latvia, and France, and the third group with HDI ≥ 0.900 included the Nordic countries, the United Kingdom, Canada, the Netherlands, and other countries with similar health, education, and economy as Iceland. Each HDI group subsequently had at least 1000 migrants. HDI classification on 211 women (3.5% of all migrants) was unavailable

because of missing data on citizenship, but they were included in the "all-migrant women" group and were analyzed separately.

2.3.2 | Covariates

The following maternal sociodemographic characteristics at the time of giving birth were obtained: age (continuous; ≤ 19 , 20-24, 25-29, 30-34, 35-39, and ≥ 40), parity (0, 1, 2, and ≥ 3), marital status (married/cohabiting and single/widowed/divorced), residence (capital area (including the capital and six surrounding municipalities), rural), number of antenatal care visits (continuous; 0, 1-3, 4-8, 9-11, and ≥ 12), and employment during pregnancy (employed, student, homemaker/on disability/unemployed).

Information was also obtained on birth-related characteristics such as induction of labor (IMBR: onset of labor; ICD-10: O83.8, NCSP: MASC00, MAXC02, and MAXC09) and augmentation of spontaneous onset of labor with oxytocin and amniotomy (NCSP: MASC05 and MAXC00), prolonged first (ICD-10: O63.0) and second stage of labor (ICD-10: O63.1) and high birthweight (IMBR: ≥ 4000). Information on place of birth, including in primary (small size labor unit with midwives and general practitioners, home birth or birth center with midwives), secondary (medium sized labor unit with midwives, obstetricians, or surgeons with obstetrical training), and tertiary (specialized maternity unit for high-risk pregnancies and births with midwives, obstetricians, anesthesiologists, neonatologists, and neonatal nurses, surgical service, and neonatal intensive care unit (NICU) available at all times) were also obtained from IMBR.

Maternal comorbidity such as diagnoses during pregnancy and birth of chronic or pregnancy-related hypertensive disorders (ICD-10: O10-11, O13-14, O15.0-1, O16, and I10) and diabetes (ICD-10: O24.0-1, O24.4, O24.9, and E10-14) were also included.

Missing variables are presented in Table 1.

2.3.3 | Outcome variables

Dichotomous outcome variables included the following nonpharmacological pain management methods, presented in Table S1: relaxation (NIC: 6040), massage (NIC: 1480), acupuncture (NCSP: AXXA00), sterile water injection (NIC: 2317), warm/cold packs (NIC: 1380), transcutaneous electrical nerve stimulation (TENS) (NIC: 1540), shower/bath (NIC: 1340), and aromatherapy (NIC: 1330). The pharmacological pain relief variables were pethidine (Meperidine) (ATC: N02AB02), nitrous oxide inhalation (NCSP: WAA740), pudendal block (NCSP: WAA230),

and epidural anesthesia (NCSP: WAA307 and ZXXX30). These variables were also combined in five composite outcome variables: only nonpharmacological methods used, only pharmacological methods used, a combination of nonpharmacological and pharmacological method used, a combination of nonpharmacological methods and nitrous oxide inhalation used, and no pain management methods used.

The registration on the use of aromatherapy was initiated in 2012; therefore, the cohort was limited to the period 2012–2018 in the analyses for aromatherapy. During the study period, no woman was registered for the use of self-hypnosis, music, acupressure, or morphine in the cohort, and only seven Icelandic women used paracervical block, and therefore, were not analyzed.

2.4 | Statistical analyses

Descriptive data were reported as numbers of observations and prevalence (%) in Tables 1 and 2. Chi-square tests were used to compare crude percentages of background variables. Fisher exact test was used if >20% of the cells had an expected count less than 5 (identified in Table 2) and *t*-test were used when comparing variable means. We used logistic regression models, with forced entry and listwise deletion of missing data, to calculate odds ratios and 95% confidence intervals (CI) for the differences in the use of pain management methods between migrant women and Icelandic women, using women with Icelandic citizenship as the reference group. Calculations were made for all women with foreign citizenship and for each of the three HDI groups separately. The models were adjusted for the following variables: Continuous: maternal age at time of giving birth, parity, number of antenatal care visits; Dichotomous: marital status, residency, employment status, induction of labor, augmentation of labor, prolonged first and second stage of labor, high birthweight, hypertensive disorder, and diabetes; and Trichotomous: place of birth.

All analyses were conducted using the statistical software SPSS (version 26).

3 | RESULTS

Among all 48 173 births, 42 076 (87.3%) were to Icelandic women and 6097 (12.7%) occurred among migrants. Table 1 presents the covariates by citizenship. Compared with Icelandic women, migrant women were more likely to be younger, married/cohabiting, have lower parity, and have labor augmentation and a prolonged first and second stage of labor. Overall, migrant women were less likely to

have a hypertensive disorder diagnosis, have their labor induced, give birth to an infant with macrosomia, be employed/student and live in the capital area, compared with Icelandic women. No differences were observed with respect to the place of birth (for migrant women overall) (Table 1).

In Table 2, the prevalence (%) of pain management methods is presented. In comparison with Icelandic women, migrant women had lower prevalence for the use of any pain management method, acupuncture, TENS, shower/bath, aromatherapy, and nitrous oxide inhalation. However, they had higher prevalence for the use of warm/cold packs and epidural anesthesia.

Table 3 shows the results for multivariate logistic regression analyses. When adjusting for covariates presented in Table 1, more migrant women overall did not use any form of pain relief (aOR = 1.23 95% CI [1.12, 1.34]), compared with Icelandic women. We observed significantly lower odds for the use of nonpharmacological methods such as acupuncture (0.73 [0.64, 0.83]), TENS (0.92 [0.01, 0.67]), shower/bath (0.73 [0.66, 0.82]), and aromatherapy (0.59 [0.44, 0.78]) in migrant women. Migrant women overall also had lower aOR for the use of nitrous oxide inhalation (0.89 [0.83, 0.96]) and a combination of nonpharmacological and pharmacological methods (0.87 [0.79, 0.95]), compared with Icelandic women. The aOR for the use of warm/cold packs (1.21 [1.07, 1.36]) was higher among migrant women. No difference was observed between all migrant groups and Icelandic women, in the use of relaxation, massage, sterile water injection, or pudendal block.

Migrant women from countries with the highest HDI score (≥ 0.900) had higher aOR in the use of no pain management method (1.27 [1.06, 1.52]) and lower aOR in the use of epidural (0.64 [0.53, 0.78]), compared with Icelandic women. Migrant women from countries with the middle HDI score (0.850–0.899) had lower aOR in the use of acupuncture (0.65 [0.55, 0.78]), shower/bath (0.74 [0.65, 0.86]), aromatherapy (0.40 [0.26, 0.61]), and only nonpharmacological methods (0.82 [0.68, 0.99]), but higher aOR in the use of warm/cold packs (1.31 [1.12, 1.52]), compared with Icelandic women. Migrant women from countries with the lowest HDI score (≤ 0.849) had lower aOR in the use of acupuncture (0.70 [0.54, 0.90]), shower/bath (0.51 [0.40, 0.64]), and nitrous oxide inhalation (0.74 [0.63, 0.86]), compared with Icelandic women. They also had lower aOR in the use of a combination of nonpharmacological and pharmacological methods (0.72 [0.60, 0.87]), a combination of nonpharmacological methods and nitrous oxide inhalation (0.72 [0.55, 0.92]), and higher aOR in the use of no pain management methods (1.52 [1.29, 1.79]), compared with Icelandic women.

When adjusted for covariates, no differences were observed in the odds of use of any pain management method

TABLE 2 The prevalence (%) of nonpharmacological and pharmacological pain management methods of birthing women with foreign citizenship (n = 6097) compared to women with Icelandic citizenship (n = 42 076) who gave birth to a singleton in Iceland during the study period 2007-2018

| | TOTAL (n = 48 173) | | Icelandic women (n = 42 076) | | All migrant women (n = 6097) | | Migrant women, HDI ≥0.900 (n = 1028) | | Migrant women, HDI 0.850-0.899 (n = 3482) | | Migrant women, HDI ≤0.849 (n = 1376) | |
|---|-----------------------|---------------|---------------------------------|------------------|---------------------------------|--------------------|---|------------------|--|--------------------|---|---------|
| | n (%) | n (%) | n (%) | p value | n (%) | p value | n (%) | p value | n (%) | p value | n (%) | p value |
| Nonpharmacological methods | | | | | | | | | | | | |
| Relaxation | 544 (1.1) | 463 (1.1) | 81 (1.3) | 0.115 | 10 (1) | 0.698 | 48 (1.4) | 0.134 | 22 (1.6) | 0.083 | | |
| Massage | 2163 (4.5) | 1899 (4.5) | 264 (4.3) | 0.518 | 48 (4.7) | 0.812 | 147 (4.2) | 0.425 | 60 (4.4) | 0.788 | | |
| Acupuncture | 5304 (11) | 4777 (11.4) | 527 (8.6) | <0.001 | 110 (10.7) | 0.514 | 279 (8) | <0.001 | 119 (8.6) | 0.002 | | |
| Sterile water injection | 407 (0.8) | 350 (0.8) | 57 (0.9) | 0.411 | 11 (1.1) | 0.408 | 36 (1) | 0.211 | 9 (0.7) | 0.473 | | |
| Warm/cold packs | 4910 (10.2) | 4182 (9.9) | 728 (11.9) | <0.001 | 109 (10.6) | 0.482 | 420 (12.1) | <0.001 | 175 (12.7) | <0.001 | | |
| TENS | 98 (0.2) | 96 (0.2) | 2 (0) | 0.002 | 1 (0.1) | 0.732 ^b | 1 (0) | 0.014 | 0 (0) | 0.076 ^b | | |
| Shower/Bath | 7188 (14.9) | 6449 (15.3) | 739 (12.1) | <0.001 | 158 (15.4) | 0.970 | 425 (12.2) | <0.001 | 136 (9.9) | <0.001 | | |
| Aromatherapy ^a | 1101 (4.1) | 1007 (4.4) | 94 (2.7) | <0.001 | 28 (5) | 0.472 | 43 (2) | <0.001 | 21 (2.7) | 0.029 | | |
| Pharmacological methods | | | | | | | | | | | | |
| Pethidine | 729 (1.5) | 618 (1.5) | 111 (1.8) | 0.035 | 13 (1.3) | 0.590 | 68 (2) | 0.024 | 25 (1.8) | 0.293 | | |
| Nitrous oxide inhalation | 22 113 (45.9) | 19 407 (46.1) | 2706 (44.4) | 0.011 | 469 (45.6) | 0.750 | 1594 (45.8) | 0.694 | 563 (40.9) | <0.001 | | |
| Pudendal block | 172 (0.4) | 149 (0.4) | 23 (0.4) | 0.777 | 3 (0.3) | 1000 ^b | 14 (0.4) | 0.649 | 6 (0.4) | 0.641 ^b | | |
| Epidural anesthesia | 19 399 (40.3) | 16 858 (40.1) | 2541 (41.7) | 0.017 | 344 (33.5) | <0.001 | 1535 (44.1) | <0.001 | 571 (42.1) | 0.134 | | |
| Combination variables | | | | | | | | | | | | |
| Only nonpharmacological methods used | 3556 (7.4) | 3163 (7.5) | 393 (6.4) | 0.003 | 87 (8.5) | 0.257 | 206 (5.9) | <0.001 | 89 (6.5) | 0.145 | | |
| Only pharmacological methods used | 21 690 (45) | 18 861 (44.8) | 2829 (46.4) | 0.021 | 429 (41.7) | 0.049 | 1683 (48.3) | <0.001 | 620 (45.1) | 0.865 | | |
| A combination of nonpharmacological and pharmacological methods used | 10 697 (22.2) | 9437 (22.4) | 1260 (20.7) | 0.002 | 204 (19.8) | 0.049 | 735 (21.1) | 0.072 | 281 (20.4) | 0.079 | | |
| A combination of nonpharmacological methods and nitrous oxide inhalation used | 4915 (10.2) | 4336 (10.3) | 579 (9.5) | 0.051 | 107 (10.4) | 0.914 | 338 (9.7) | 0.264 | 117 (8.5) | 0.030 | | |
| No pain management methods used | 12 230 (25.4) | 10 615 (25.2) | 1615 (26.5) | 0.035 | 308 (30) | <0.001 | 858 (24.6) | 0.443 | 386 (28.1) | 0.018 | | |

Note: Denominators vary because of missing values and exclusion criteria. The bold italics values was to define the significance P-values < .05.

^aFirst registered during the period 2012-2018. Total 26 583, migrant 3538, Icelandic 23 045, migrant women HDI ≥0.900 560, HDI 0.850-0.899 2 118, HDI ≤0.849 766.

^bIf Chi-square tests was not valid due to >20% cells have exp.count less than 5, Fisher's exact test was used.

TABLE 3 Crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for the use of nonpharmacological and pharmacological pain management methods in birthing women with foreign citizenship (n = 6097) compared to women with Icelandic citizenship (n = 42 076) who gave birth to a singleton in Iceland during the study period 2007-2018

| | All migrant women (n = 6097) | | Migrant women, HDI ≥ 0.900 (n = 1028) | | Migrant women, HDI 0.850-0.899 (n = 3482) | | Migrant women, HDI ≤ 0.849 (n = 1376) | |
|---|------------------------------|-------------------------|---------------------------------------|-------------------------|---|-------------------------|---------------------------------------|-------------------------|
| | OR (CI) | aOR ^a (CI) | OR (CI) | aOR ^a (CI) | OR (CI) | aOR ^a (CI) | OR (CI) | aOR ^a (CI) |
| Nonpharmacological methods | | | | | | | | |
| Relaxation | 1.21 (0.95-1.54) | 1.32 (0.36-1.86) | 0.88 (0.47-1.66) | 1.30 (0.63-2.65) | 1.26 (0.93-1.70) | 1.40 (0.92-2.14) | 1.46 (0.95-2.45) | 1.17 (0.60-2.29) |
| Massage | 0.96 (0.84-1.09) | 1.02 (0.86-1.21) | 1.04 (0.77-1.39) | 1.14 (0.80-1.62) | 0.93 (0.79-1.11) | 1.05 (0.84-1.31) | 0.97 (0.74-1.26) | 0.87 (0.62-1.23) |
| Acupuncture | 0.74 (0.67-0.81) | 0.73 (0.64-0.83) | 0.94 (0.77-1.14) | 0.99 (0.77-1.26) | 0.68 (0.60-0.77) | 0.65 (0.55-0.78) | 0.74 (0.61-0.89) | 0.70 (0.54-0.90) |
| Sterile water injection | 1.13 (0.85-1.49) | 1.03 (0.70-1.52) | 1.29 (0.71-2.36) | 1.48 (0.75-2.93) | 1.25 (0.88-1.76) | 1.00 (0.61-1.66) | 0.79 (0.40-1.52) | 0.80 (0.36-1.77) |
| Warm/cold packs | 1.23 (1.13-1.34) | 1.21 (1.07-1.36) | 1.08 (0.88-1.31) | 1.09 (0.84-1.42) | 1.24 (1.12-1.38) | 1.31 (1.12-1.52) | 1.32 (1.12-1.55) | 1.08 (0.86-1.36) |
| TENS | 0.14 (0.04-0.58) | 0.92 (0.01-0.67) | 0.43 (0.06-3.06) | - | 0.13 (0.02-0.90) | 0.18 (0.03-1.31) | - | - |
| Shower/Bath | 0.76 (0.70-0.83) | 0.73 (0.66-0.82) | 1.00 (0.85-1.19) | 1.10 (0.88-1.36) | 0.77 (0.69-0.85) | 0.74 (0.65-0.86) | 0.61 (0.51-0.73) | 0.51 (0.40-0.64) |
| Aromatherapy ^b | 0.60 (0.48-0.74) | 0.59 (0.44-0.78) | 1.15 (0.78-1.69) | 1.16 (0.72-1.88) | 0.45 (0.33-0.62) | 0.40 (0.26-0.61) | 0.62 (0.40-0.96) | 0.65 (0.38-1.10) |
| Pharmacological methods | | | | | | | | |
| Pethidine | 1.24 (1.02-1.53) | 1.17 (0.87-1.56) | 0.86 (0.49-1.49) | 0.65 (0.30-1.40) | 1.34 (1.04-1.72) | 1.21 (0.84-1.74) | 1.24 (0.83-1.86) | 1.69 (0.99-2.89) |
| Nitrous oxide inhalation | 0.93 (0.88-0.98) | 0.89 (0.83-0.96) | 0.98 (0.87-1.11) | 1.00 (0.86-1.17) | 0.99 (0.92-1.06) | 0.94 (0.85-1.03) | 0.81 (0.73-0.90) | 0.74 (0.63-0.86) |
| Pudendal block | 1.07 (0.69-1.65) | 0.84 (0.47-1.50) | 0.82 (0.26-2.59) | 0.60 (0.15-2.47) | 1.13 (0.66-1.97) | 1.19 (0.61-2.29) | 1.23 (0.54-2.79) | 0.43 (0.1-1.81) |
| Epidural anesthesia | 1.05 (0.98-1.13) | 0.96 (0.87-1.04) | 0.75 (0.66-0.86) | 0.64 (0.53-0.78) | 1.18 (1.10-1.26) | 1.11 (0.99-1.24) | 1.09 (0.98-1.21) | 0.91 (0.77-1.08) |
| Combination variables | | | | | | | | |
| Only nonpharmacological methods used | 0.85 (0.76-0.95) | 0.89 (0.77-1.02) | 1.14 (0.91-1.42) | 1.12 (0.85-1.47) | 0.77 (0.67-0.90) | 0.82 (0.68-0.99) | 0.85 (0.68-1.06) | 0.88 (0.68-1.16) |
| Only pharmacological methods used | 1.07 (1.01-1.12) | 0.98 (0.90-1.06) | 0.88 (0.78-1.00) | 0.86 (0.73-1.01) | 1.51 (1.08-1.23) | 1.03 (0.93-1.13) | 1.01 (0.91-1.12) | 0.95 (0.82-1.10) |
| A combination of nonpharmacological and pharmacological methods used | 0.90 (0.84-0.96) | 0.87 (0.79-0.95) | 0.86 (0.73-1.00) | 0.88 (0.72-1.08) | 0.93 (0.85-1.01) | 0.94 (0.83-1.07) | 0.89 (0.78-1.01) | 0.72 (0.60-0.87) |
| A combination of nonpharmacological methods and nitrous oxide inhalation used | 0.91 (0.83-1.00) | 0.93 (0.82-1.05) | 1.01 (0.83-1.24) | 1.10 (0.86-1.41) | 0.94 (0.83-1.05) | 0.98 (0.84-1.15) | 0.81 (0.67-0.98) | 0.72 (0.55-0.92) |
| No pain management methods used | 1.07 (1.01-1.14) | 1.23 (1.12-1.34) | 1.27 (1.11-1.45) | 1.27 (1.06-1.52) | 0.97 (0.89-1.05) | 1.10 (0.99-1.23) | 1.16 (1.03-1.30) | 1.52 (1.29-1.79) |

Note: Denominators vary because of missing values and exclusion criteria. The bold italics values was to define the significance P-values < .05.
^aAdjustments were made for maternal age at time of giving birth, parity, marital status, residency, number of antenatal care visits, employment status, induction of labor, augmentation of labor, prolonged first and second stage of labor, high birthweight, place of birth, hypertensive disorder, and diabetes.
^bFirst registered 2012. Cohort limited during the period 2012-2018. Total n = 26 583, Icelandic n = 23 045, migrant n = 3538, Icelandic n = 2045, migrant women HDI ≥ 0.900 n = 560, HDI 0.850-0.899 n = 2118, HDI ≤ 0.849 n = 766.

among women with missing data on citizenship when compared to women with Icelandic citizenship.

4 | DISCUSSION

The results from this nationwide study indicate less use of pain relief among migrant women in Iceland between 2007 and 2018, compared with Icelandic women. Moreover, the results suggest higher odds of no pain relief use among migrant women from countries with the highest and lowest HDI score and lower odds of nonpharmacological pain management methods, such as acupuncture and shower/bath among migrant women from countries with a HDI score <0.900. In addition, lower odds were observed of the use of warm/cold packs, aromatherapy, nitrous oxide inhalation, pethidine, and a combination of nonpharmacological and pharmacological methods among migrant women from countries with the lowest HDI score. Migrant women from countries with the highest HDI score had lower odds of epidural use, compared with Icelandic women. Higher odds were only observed on the use of warm/cold packs for migrant women from countries with the middle HDI score, compared with Icelandic women.

The findings are open to different interpretations. On the one hand, migrant women may have a more natural approach to childbirth and higher levels of confidence and trust in their own body to manage labor pain. Conversely, disparities in access to all options in maternity care and lack of full exposure to quality antenatal and intrapartum midwifery care may be a factor.^{11,21} Still, a large group of women in each category (70%-75%) used some type of pain management. Nitrous oxide inhalation was the most used (44%-46%) pain management method within all groups of women, except for migrant women in the lowest HDI group, where epidural anesthesia had the highest prevalence (42% compared with 41% for the use of nitrous oxide inhalation).

Comparison of our results with previous studies on the use of pain management methods during labor among migrant women, compared with women in the respective host countries, is limited due to different study methods and group composition about reason for migration and country of citizenship.²⁷ In a Finnish study,²⁴ migrant multiparous women had a slightly higher prevalence of the use of any pain relief in comparison with Finnish women (70% vs 68%, $P < 0.01$). These results do not align with our findings where primi- and multiparous migrant women had lower prevalence of the use of any pain relief in comparison to Icelandic women (73.5% vs 74.8%, $P = 0.035$). Our results on lower odds of the use of nonpharmacological pain management methods among

migrant women overall align with a Swedish study,¹¹ and might indicate difference in cultural preferences, access, and quality of care for migrant women. The overall underutilization of pain management methods among migrant women compared with Icelandic women in our study, especially among women from countries with HDI scores <0.900, is a possible indication of problems with accessibility and disparities in antenatal and intrapartum midwifery care.²² Shortcomings in the caregiving relationship can be a barrier to quality intrapartum care. Due to cultural and linguistic differences, midwives may not be able to accurately interpret the wishes of migrant women, provide sufficiently individualized care, and/or adequately describe the options available in a manner that is meaningful for the birthing person. Circumstances affecting the use of interpreters in the birth setting could restrict the provision of equitable care.²⁸ In addition, cultural barriers or an educational gap between a woman and the midwife can affect equitable care, and the response to the woman's pain expression.²¹ Expressions of pain are strongly influenced by cultural, emotional, motivational, social, and cognitive factors.²⁹ Inability to offer respectful care and not wanting to, or not being able to, understand the migrant woman can affect health beliefs among migrant women about when, where, and how to seek help.³⁰ Given the administrative nature of our data, these factors were not measured in our study.

Our results on lower aORs for epidural use among migrant women in the highest HDI group are similar to other research^{7,10,14}; however, there was no difference in epidural use among migrant women with citizenship from countries with HDI <0.900, which is different to other studies.^{7,10,15,16} Although less use of nonpharmacological pain relief in the lower HDI groups of migrant women may to some extent be explained by cultural and linguistic barriers and an educational gap, less use of epidural by the highest HDI group may, conversely, be explained by higher education levels and more access to evidence-based information in a woman's language.

For migrant women to be able to access services they need when they need them, such as pain relief, depends on whether the Icelandic maternity service can reach and inform the targeted group, with health education, promotion, and preventive care.³¹ Even though financial means may be a practical barrier for the minority of women migrating from outside the EEA, cost of care should not be an issue for the majority of migrant women in Iceland—with the exception of childbirth education. However, language barriers can be an issue for many migrant women. There have been almost no antenatal educational programs in different languages in Iceland, where most of the education on pain management methods take place. Cultural mediators, who can have an important role in reducing

social and cultural barriers to access,³² are not easily available in Iceland. Our previous study¹ found an increase in instrumental births and episiotomy among migrant women, which strengthens our interpretation that access and quality of care may not be equitable for all women giving birth in Iceland. Nevertheless, further studies are needed to examine whether the effect of having foreign citizenship on the use of pain management methods in labor is mediated through other factors such as education²³ and cultural preferences.

The presence of pain is not necessarily connected to a negative birth experience.³³ However, women need access to effective, simple, and safe ways to help them cope with labor. Their involvement in well-informed decision making and respectful support from midwives may be more important to women than pain relief itself.³⁴

4.1 | Strengths and limitations

This study is the first of its kind in Iceland. Its main strength is the use of prospectively and independently collected registry-based population data for 11 years, therefore unlikely to have selection and information bias. A limitation of the study is the lack of information on citizenship for 211 migrant women, which can lead to exposure distortion. They were, however, analyzed in the “all-migrant women” group. The lack of information on education, length of residence, continuous support in labor, participation in prenatal classes, language skills, the use of interpreters, and labor pain intensity, due to using administrative data, was a limitation. This would have allowed for a more nuanced interpretation of the results. In addition, the use of morphine and pethidine in labor can be misleading, as we cannot rule out whether its use was in fact after childbirth or even during emergency cesarean birth, and thus, this can also be considered a limitation to the study.

4.2 | Conclusions

The results of this study add important knowledge on use of different pain management methods in labor among migrant women in Iceland compared with Icelandic women. Our results suggest that being a migrant woman in Iceland from a country with a lower HDI score is an important factor that decreases the use of nonpharmacological pain management methods without increasing the use of pharmacological pain relief. On the other end of the spectrum, migrant women who had citizenship from countries with a high HDI score showed similar use as Icelandic women except for lower odds of epidural use.


Furthermore, studies are needed, particularly including migrant women's experience of intrapartum care, their care needs, and cultural preferences with respect to intrapartum midwifery care. Our findings have implications for maternity care practice, including the increased use of interpreters to ensure clear communication, supply of antenatal educational programs in different languages, and culturally sensitive, high-quality, individualized care for all pregnant women, and particularly for migrant women with citizenship from countries with HDI score <0.900.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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REFERENCES

1. Guðmundsdóttir EY, Gottfreðsdóttir H, Hálfhánsdóttir B, Nieuwenhuijze M, Gissler M, Einarsdóttir K. Challenges in migrant women's maternity care in a high-income country: a population-based cohort study of maternal and perinatal outcomes. *Acta Obstet Gynecol Scand.* 2021;100(9):1665-1677.
2. Statistics Iceland Immigrants 15.2% of the countries population. 2020. <https://hagstofa.is/utgafur/frettasafn/mannfoldi/mannfoldi-efir-bakgrunni-2020/>. Accessed June 6, 2021.
3. Halldorsdóttir S, Karlsdóttir SI. Empowerment or discouragement: women's experience of caring and uncaring encounters during childbirth. *Health Care Women Int.* 1996;17(4):361-379.
4. Schulling KD. Promoting comfort: a conceptual approach. In: Avery MD, ed. *Supporting a Physiologic Approach to Pregnancy and Birth: A Practical Guide.* John Wiley & Sons, Inc.; 2013:77-89.
5. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database Syst Rev.* 2013;7.
6. Chaillet N, Belaid L, Crochetiere C, et al. Nonpharmacologic approaches for pain management during labor compared with usual care: a meta-analysis. *Birth.* 2014;41(2):122-137.
7. Aasheim V, Nilsen RM, Vik ES, Small R, Schytt E. Epidural analgesia for labour pain in nulliparous women in Norway in relation to maternal country of birth and migration related factors. *Sex Reprod Healthc.* 2020;26:100553.
8. Steel A, Adams J, Sibbritt D, Broom A, Gallois C, Frawley J. Managing the pain of labour: factors associated with the use of labour pain management for pregnant Australian women. *Health Expect.* 2015;18(5):1633-1644.
9. Ekéus C, Hjern A, Hjelmstedt A. The need for epidural analgesia is related to birthweight—a population-based register study. *Acta Obstet Gynecol Scand.* 2009;88(4):397-401.

10. Ekéus C, Cnattingius S, Hjern A. Epidural analgesia during labor among immigrant women in Sweden. *Acta Obstet Gynecol Scand.* 2010;89(2):243-249.
11. Robertson E, Johansson SE. Use of complementary, non-pharmacological pain reduction methods during childbirth among foreign-born and Swedish-born women. *Midwifery.* 2010;26(4):442-449.
12. Rust G, Nembhard WN, Nichols M, et al. Racial and ethnic disparities in the provision of epidural analgesia to Georgia Medicaid beneficiaries during labor and delivery. *Am J Obstet Gynecol.* 2004;191(2):456-462.
13. Bakken KS, Skjeldal OH, Stray-Pedersen B. Immigrants from conflict-zone countries: an observational comparison study of obstetric outcomes in a low-risk maternity ward in Norway. *BMC Pregnancy Childbirth.* 2015;15(1):1-2.
14. David M, Pachaly J, Vetter K. Perinatal outcome in Berlin (Germany) among immigrants from Turkey. *Arch Gynecol Obstet.* 2006;274(5):271-278.
15. Small R, Gagnon A, Gissler M, et al. Somali women and their pregnancy outcomes postmigration: data from six receiving countries. *BJOG.* 2008;115(13):1630-1640.
16. Bastola K, Koponen P, Härkänen T, Luoto R, Gissler M, Kinnunen TI. Delivery and its complications among women of Somali, Kurdish, and Russian origin, and women in the general population in Finland. *Birth.* 2019;46(1):35-41.
17. Duff C, Sinclair M. Exploring the risks associated with induction of labour: a retrospective study using the NIMATS database. *J Adv Nurs.* 2000;31:410-417.
18. Bohren MA, Hofmeyr GJ, Sakala C, Fukuzawa RK, Cuthbert A. Continuous support for women during childbirth. *Cochrane Database Syst Rev.* 2017;7.
19. Fabian HM, Rådestad IJ, Waldenström U. Childbirth and parenthood education classes in Sweden. Women's opinion and possible outcomes. *Acta Obstet Gynecol Scand.* 2005;84(5):436-443.
20. Maimburg RD, Vaeth M, Dürr J, Hvidman L, Olsen J. Randomised trial of structured antenatal training sessions to improve the birth process. *BJOG.* 2010;117(8):921-928.
21. Small R, Yelland J, Lumley J, Brown S, Liamputtong P. Immigrant women's views about care during labor and birth: an Australian study of Vietnamese, Turkish, and Filipino women. *Birth.* 2002;29(4):266-277.
22. Räisänen S, Kokki M, Kokki H, Gissler M, Kramer MR, Heinonen S. The use of epidural analgesia for intrapartum pain relief in publicly funded healthcare. *Acta Anaesthesiol Scand.* 2014;58(3):291-297.
23. Razum O, Reiss K, Breckenkamp J, et al. Comparing provision and appropriateness of health care between immigrants and non-immigrants in Germany using the example of neuraxial anaesthesia during labour: cross-sectional study. *BMJ Open.* 2017;7(8):e015913.
24. Malin M, Gissler M. Maternal care and birth outcomes among ethnic minority women in Finland. *BMC Public Health.* 2009;9(1):1-4.
25. World Health Organization. Regional Office for Europe. *Improving the Health Care of Pregnant Refugee and Migrant Women and Newborn Children: Technical Guidance.* Copenhagen: World Health Organization. Regional Office for Europe; 2018. <https://apps.who.int/iris/handle/10665/342289>
26. Berg M, Ólafsdóttir ÓA, Lundgren I. A midwifery model of woman-centred childbirth care—In Swedish and Icelandic settings. *Sex Reprod Healthc.* 2012;3(2):79-87.
27. Rispling L. Major immigration flows to the Nordic Region. In: Karlsdóttir A, Rispling L, Norlén G, Randall L, eds. *State of the Nordic Region 2018: Immigration and Integration Edition.* Copenhagen: Nordic Council of Ministers; 2018. <https://norden.diva-portal.org/smash/get/diva2:1192284/FULLTEXT01.pdf>
28. Robertson E. *Aspects of Foreign-Born Womens Health and Childbirth-Related Outcomes: An Epidemiological Study of Women of Childbearing Age in Sweden.* Stockholm: Karolinska University Press; 2003. <https://openarchive.ki.se/xmlui/bitstream/handle/10616/39441/thesis.pdf?sequence=1&isAllowed=y>
29. Marchand S. Theories of Pain. In: *The Phenomenon of Pain.* IASP Press; 2012.
30. Williams B, Healy D. Perceptions of illness causation among new referrals to a community mental health team: “explanatory model” or “exploratory map”? *Soc Sci Med.* 2001;53(4):465-476.
31. World Health Organization. *How Health Systems can Address Health Inequities Linked to Migration and Ethnicity.* Copenhagen: WHO Regional Office for Europe; 2010. https://www.euro.who.int/__data/assets/pdf_file/0005/127526/e94497.pdf
32. Ledoux C. Principles of best and good practices in migrants' access to health services. *Albanian Med J.* 2015;4:62-71.
33. Simkin P, Bolding A. Update on nonpharmacologic approaches to relieve labor pain and prevent suffering. *J Midwifery Womens Health.* 2004;49(6):489-504.
34. Hodnett ED. Pain and women's satisfaction with the experience of childbirth: a systematic review. *Am J Obstet Gynecol.* 2002;186(5):S160-S172.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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Paper III

ORIGINAL RESEARCH ARTICLE

ARTICLE TITLE:

“She’s going to give me information and support me like no one else can”: A longitudinal qualitative study on Polish women’s care needs, expectations, and experience of midwifery care during birth in a foreign country.

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Abstract

Background: Icelandic society has become a more heterogeneous community in the past decades. Recent studies indicate disparities in perinatal outcomes when it comes to migrant women living in Iceland.

Aim: To explore Polish immigrant women's needs, expectations and experience of midwifery care during birth in Iceland.

Methods: A longitudinal, qualitative study design with individual semi-structured interviews conducted in December 2021 to May 2022. Eight women with a Polish citizenship participated in two interviews, during pregnancy and after birth. The interviews were analysed using reflexive thematic analysis.

Findings: One theme was developed from interviews conducted during pregnancy: (1) Feeling not understood, alone and scared. Two themes were generated from interviews conducted after birth: (1) Having someone who guides and accompanies you through pregnancy and birth; and (2) The importance of having a voice. Two themes were generated in the longitudinal analysis of the interviews taken during pregnancy and after birth: (1) Respectful individualized care; and (2) Importance of sharing information and getting answers to your questions.

Discussion: Insecurity was a feeling expressed by many women in our study, in particular regarding pain relief in labour and communication. Good communication as well as establishing a connection to the midwife was an overall need among all the women.

Conclusion: Migrant women's care situation in a new country is related to good communication and connection to others.

Keywords

Midwifery, migrants, care, needs, experience, birth

Statement of Significance

Problem: Challenges in maternity care in high-income countries seem to be related to communication and access to care.

What is Already Known: Migrant women are in a vulnerable position when pregnant and giving birth, and need their own strength and resources acknowledged.

What this Paper Adds: The paper highlights a feeling of insecurity among migrant women and the importance of providing them a safe space to express their needs and formulate their goals and ensure that they are provided with information in line with their needs and wishes of the women giving birth. This involves good communication, the use of translators if needed with a woman-centered care, respect, and kindness.

ORIGINAL RESEARCH ARTICLE

ARTICLE TITLE:

“She’s going to give me this information and support me like no one else can”: A longitudinal qualitative study on Polish women’s care needs, expectations, and experience of midwifery care during birth in a foreign country.

1. Introduction

Midwifery support during birth is one of the key factors contributing to a positive childbirth experience [1,2,3]. Studies show four main factors that influence women’s childbirth experience: personal expectations, support from caregivers, the quality of the relationship between a woman and her caregiver, and women’s participation in decision making [4]. The influences of pain, pain relief and intrapartum medical interventions are less powerful than the influences of the attitudes and behaviors of the caregivers, when it comes to women’s childbirth experiences [4]. Promoting and enhancing comfort during birth is an integral part of the ‘art’ of midwifery care [5].

The population in Iceland has become more heterogeneous. In 2019, foreign citizens were 14.1% of the population [6], and Polish women were 34.6% of all migrant women [7]. Increasing knowledge on migration highlights the necessity to recognize the needs of a more diverse group of women in maternity care. In several qualitative studies the experience of maternity care among migrant women has been explored, revealing a relationship between women’s experience of social inequality and their access to pre-, intra- and postpartum care [8,9]. Migrant women are in a vulnerable position when pregnant and giving birth, which is caused by their expectations, circumstances and need for adaptability [8,10]. Individual, sensitive care appears to be insufficient and maternity care services must be adapted to migrant women’s expectations of support and their cultural differences while concurrently acknowledging women’s strength and resources [8]. This study is a part of a bigger project that aims to gain deeper knowledge of the care and outcomes of childbirth among migrant women in Iceland. Our previous studies suggest that migrant women in Iceland compared to native born women have higher odds of obstetric interventions, [11] and lower odds of the use of non-pharmacological pain relief methods without increasing the use of pharmacological pain relief [12]. A recent study conducted in Iceland indicate that migrant women perceive lower level of respect and autonomy in maternity care compared to Icelandic women [13]. These results might indicate inequity in access and quality of care, but limited knowledge exists about migrant women’s experience of midwifery care during birth. This study aims to explore the needs, expectations, and experience of midwifery care during birth of Polish women in Iceland as they are the most populous group of migrant women in the country.

2. Methods

2.1 Setting

Iceland has a health care system that provides maternity care for all women free of charge, except for migrant women from outside the European Economic Area (EEA) during their first 6 months in the country [14]. The maternity care in Iceland is fragmented although continuity of care is emphasized. Antenatal care is provided by midwives through the primary care system, and women receive care in hospitals in case of complications and medical risks. There are around 4.500 births annually in Iceland and most women (over 80%) give birth in the National University Hospital, a tertiary hospital in the capital, Reykjavik, where two third of birthing women have residence [12]. All women are attended by midwives during labour, who refer to an obstetrician if complications arise. Generally, women do not know their intrapartum midwife beforehand, however, continuous support from one midwife is promoted during labour. The use of interpreter service in maternity care is unknown, although migrant women are entitled to free interpreter service [15].

2.2 Participants and recruitment

We conducted the study using a longitudinal, qualitative design with individual semi-structured interviews using reflexive thematic analysis [16].

A convenience sampling approach was used, and eligible women invited through two different methods. First, midwives offering antenatal care introduced the study to pregnant Polish women in their third trimester. The midwives used an information sheet, which explained what participation in the study entailed. The inclusion criteria were that the participants were Polish, in their third trimester, over 18 years old and planned to give birth in Iceland. Secondly, a Polish woman known by the researcher was asked to introduce the study to Polish women in a facebook group called „Polish women in Iceland“. Overall nine women accepted to participate and they all agreed to receive an email with further information in Polish about the study. They were invited to ask questions before deciding on participation. Each woman would be interviewed twice, once during pregnancy and once postpartum. Seven women showed interest through the facebook group and they all participated in the study and two expressed interest in taking part to midwives in antenatal care, but one of them gave birth before the interview. In total eight women participated in both interviews of the study. The time and place of the interviews were decided by the participant. Five interviews took place through zoom and eleven in person. We stopped recruitment when the interviews provided enough rich data in order to meet the aims of our study.

The participants had been living in Iceland between 1 to 5 years with age range from 24 to 35 years. Five were married and three in a relationship, all with Polish partners. They lived in the capital area

and all, but one, were studying or were employed. Further background information can be seen in table one (Table 1).

2.3 Ethics

This study obtained ethical approval from the National Bioethics Committee on 11 June 2019. The participation was voluntary, and prior to the interview, all participants signed an informed consent form. As an incentive and appreciation of the time it takes to participate, the women were paid 5000 ISK for their efforts.

In general, collection of data with migrant women may pose challenges. Migrant women are a diverse group, often in a vulnerable position and may be intimidated by power differences between themselves and the researchers. They may find the topic sensitive and/or have limited time or desire to engage in research. Also, by collecting in-depth data from the same participant over time, ethical issues can be amplified, such as intrusion, distortion of experience and dependency [17]. Therefore, following the interviews, all participants had access to a midwife independent from the study, who specializes in providing care to vulnerable women should difficult emotions arise. None of the participants took up the offer to consult with her.

2.4 Data collection

Interviews were conducted in December 2021 to May 2022, during the COVID-19 pandemic, by the first author, under the supervision of two researchers experienced in qualitative research methods. A female Polish translator translated the interviews which lasted between 48 and 138 minutes, with a mean duration of 87 minutes. All the interviews were recorded and typed verbatim in Icelandic. Quotations presented in this paper have been translated forwards and backwards from Icelandic into English by the first author and discussed with co authors fluent in English and Icelandic. Two separate interview guides, developed by the research team, were used, one for pregnancy and one for after birth. The interview guides were piloted on three migrant women from Poland. The questions were then reviewed pertaining to its language, length, wording and relevance. Some questions were rephrased. The interviews were semi-structured and the questions were used as a guidance in accordance with the aim of the study. The key questions sought to explore what kind of feelings arise when the participants thought about the birth during pregnancy, what kind of birth they opted for and how they would describe their ideal care in labour. In the interviews after birth the participants were asked to describe their experience and care needs during birth. They were also asked if there was something in the care they received that they would have liked to be different and if they experienced comfort during birth. Participants were given opportunity to discuss freely based on the questions asked and the first author used probing questions to elicit further in-depth information.

2.5 Data analysis

Reflexive thematic analysis was used [16]. We verbally transcribed the data and generated initial codes, taking all data into equal consideration. Then we generated themes from the codes representing a distinctiveness and internal coherence. The themes were cross-checked against each other and were grounded in the data. We discussed theme definitions in the research team, before deciding on the themes presented in this paper. We sorted significant extracts from the data to support the analysis where appropriate. First, the migrant women's needs and expectations were analysed from the dataset gathered during pregnancy. Secondly, the migrant women's experiences were analysed from the dataset gathered after birth. Thirdly, the two interviews with each individual were analysed together to get an insight into how the individual birth experience related to the needs and expectations each woman had mentioned during pregnancy. Themes were generated to capture what was important considering the aim of the study [18]. Our goal was to provide a well-organized analytical story, based on a thoughtful reflection on how the themes were developed from the data and addressed the research questions. ATLAS.ti Mac (Version 9.1.3 (2089)), a qualitative data analysis program was used to organize and process themes and patterns of meaning from the interviews.

Preliminary data analysis was done by the first author, but all authors contributed to the final analysis. The researcher who conducted the interviews is a midwife of the same gender as the participants, with good experience in clinical work. Also, two of the researchers are midwives and professors with a good experience in clinical and academic work, one of them residing in the Netherlands. The fourth researcher is a senior lecturer in qualitative research with a background in social psychology and gender studies; thus, all brought a different perspective to the analysis, adding benefit to the study.

3. Results

We generated one theme from interviews conducted during pregnancy: (1) Feeling not understood, alone and scared. Two themes were generated from interviews conducted after birth: (1) Having someone who guides and accompanies you through pregnancy and birth; and (2) The importance of having a voice. Two themes were generated in the longitudinal analysis of the interviews taken during pregnancy and after birth: (1) Respectful individualized care; and (2) Importance of sharing information and getting answers to your questions (Figure 1).

3.5 Interviews during pregnancy

3.5.1 Theme 1- Feeling not understood, alone and scared

When the women spoke of their feelings about the upcoming birth, most women mentioned that they felt insecure. They linked this to the uncertainty of what the birth would be like. They expressed uncertainty about the experience of pain in labour, but also about the labour process and their interaction with the midwife. Both primiparous and multiparous women mentioned this uncertainty, the latter also linked it to previous experience.

It's fear, just anxiety and worries about pain and uncertainty, what kind of experience it will be and how difficult it will be and what I can expect (6).

Despite this feeling of insecurity regarding communication, nearly all spoke of the trust that midwives and doctors would intervene if necessary.

The women mentioned that good communication was a vital part of their intrapartum care, that this was the antidote for the insecurity they feared. They wanted clear communication to avoid misunderstandings. For them, communication was not merely transmitting information but also imparting ideas and emotions. The women expressed strong desires for respectful, sensitive, kind, and supportive care.

That she would be calming me down while she would give me all the information about what is happening and just the necessary information, calmly and in a clear way. So just avoid misunderstandings (1).

Some of the women were planning to use their partners as translators but had doubts as they anticipated that it could be stressful for their partners to translate and at the same time give them support. Some didn't know they had a right to have a translator present during labour, whereas others planned to ask for a translator should the communication become difficult. They were all hoping for a midwife who would be kind and helpful. „Yes, to be sympathetic to people and to be helpful, as I said, I would say that a midwife should be like that and just take good care of me“ (3). However, some feared that the presence of their partner would inhibit connection with the midwife. As if, they felt they would get more support from the midwife if their partner was not present. They based this on earlier experiences in Poland and on stories from women who had given birth in Poland.

Being informed was indicated as a very important part of the communication with their midwife and her care, informed decision-making is noticeable in many of the women's narratives.

She says that, clearly, so that I can make informed decisions about what's going on. Because I know I'm going to be stressed and this is a birth, so a woman is not 100% you know, so this is what, yes, that kind of expectation for the midwife, is that she's going to give me this information and support me like no one else can, in this situation (5).

The need for information was also important in relation to the uncertainty about the labour process. Power differences between the woman and the medical staff, and hierarchy were reflected in their descriptions of how someone might do something to them or their body without a conversation, their consent and will. The feeling of not being taken seriously, anxiety about having their needs disregarded at a vulnerable moment became visible. The following quote is from a first-time mother.

..., if they are going to do something to my body, saying in advance that this or what is coming, or that it will not be done without me being informed of what's next (1).

Communication in which midwives offer directions and coping strategies was mentioned as an important part of support in labour and seen as a way to deal with the insecurity that can accompany birth.

Just give me support and for example remind me to breathe and just guide me on everything I need to do. Because I know this is going to be stressful and one is not quite thinking in this situation, so I would just like her to guide me through this experience (3).

3.6 Interviews after birth

3.6.1 Theme 1 – Having someone who guides and accompanies you through pregnancy and birth

Most of the women chose to have their partner with them during labour. Those who had their partner with them, all appreciated their presence and indicated that they felt well supported by them. Their partner's emotional support was described in all the interviews as well as descriptions of the physical support they offered, such as help in changing positions and getting food and drinks during labour. The partner's support was appreciated even though the plan was not to have him present at birth, which applied to two women.

Yes, I imagined he would not be present. You know, I thought he would just be in the hall, and I would give birth alone with the midwife, but he just walked in with me and never left. So, it ended up that he was present, and it was just crazy. That said, he gave me support and he was even present afterwards and with me the whole time. So, I would say he did more than I had imagined during the pregnancy, he would ever do (7).

However, due to COVID-19 restrictions, some of the women experienced being left alone during labour. This applied to two women, where their partners couldn't stay with them during labour but were allowed to come in the end when they were about to give birth to their baby.

I felt really bad, I cried all the time, being alone, and my husband, we were, he was on the phone, you know, on loudspeaker, but it's not the same and it just took away all the joy from my experience, my birth experience, in fact (4).

To be cared for by a good midwife was frequently mentioned when asked what affects a good service during labour. The frequently mentioned characteristics of the good midwife were that she would be

kind, warm, friendly and calm. „Yes, it matters, appearance and whether the midwife is friendly and warm and so on and I thought she was“ (4).

When asked what contributed to a feeling of comfort during labour, the care from the midwife was a strong factor.

You know, that I'm being cared for and that the midwives do care about me and just that we can be two in the room and just everything. You know, that she listens and yes, this was, this is very important (6).

3.6.2 Theme 2 - The importance of having a voice

The feeling of security was important to the women and some of them experienced that they had established a trusting relationship with the midwife when they sensed they were respected. It was not only when they were allowed to make their own decision but it was also important when they were helped to fulfill their choice. Several women described an experience of how the midwives' workload or their inability to interpret the wishes of the women prevented them from using the pain relief methods they had planned during pregnancy. These conditions made it difficult for the midwives to support the natural process of birth. A woman who wished to use water for pain relief and give birth in a bathtub was disappointed when not given that option and ended up asking for an epidural.

I asked if I could give birth in the water but she said there was not a room available with a bathtub. But my husband, he went to the hallway and saw that there was an empty room with a bath, where it was possible to give birth in (1).

This situation affected the woman's trust in the midwife as they were told something they believed was perhaps untrue.

Communication was a very important factor in midwifery care during labour. All women wanted to be part of the decision making process, and half of them emphasized a need for being guided through the birthing process and offered a translator.

We just needed a translator. But I was so nervous before the labour started [...], to go alone, but I didn't understand. I suddenly became very afraid, perhaps because there was no translator, I don't know (2).

I mostly just needed support and guidance, and I got everything I needed there, the midwives were very helpful and were guiding me (3).

Communication was also about being well informed e.g. about various coping strategies where the individual need and wishes of the women were taken into consideration by the midwife. But this was not always the case as one woman expressed that the birth had been in accordance with the

preferences of the midwife, not her own wishes and needs. The midwife made no effort to get to know the needs of the woman „*I know what I want. The birth would have been different. But the birth was just like the midwife wanted*“ (1). Building trust was important and continuity of care during labour enabled this communication between the women and the midwife.

We had a trust between us and so I felt like I knew her a little bit and I can imagine that it would be very difficult to build trust with a person in the middle of labour (4).

3.7 Longitudinal analysis

3.7.1 Theme 1 –Respectful individualized care

Descriptions of respectful individualized care were described by the women in a number of interviews. When women’s preferences mentioned during pregnancy were not met they experienced disappointment regarding intrapartum midwifery care. One of the preferences that was often mentioned concerned pain management, as the experience of physical pain was worse than the majority of the women had anticipated. The women who mentioned not being offered various pain relief methods during labour also experienced a hard time in communicating with the midwife and were more likely to be disappointed with midwifery care. They expressed the need for a translator in the pregnancy interviews but were not offered one during labour. Also, two women experienced disappointment when they were left alone in the labour room after mentioning the importance of midwifery support during labour in the pregnancy interviews.

However, most women said that their experience of birth was better than they had anticipated and this was not only attributed to the joy they experienced when they had their baby in their arms, they also mentioned good midwifery care and how their individual needs were met.

I was nervous before the birth and it was because of these two women, that I am now saying that it was a good birth, primarily because of these two midwives. I felt as if not only the child was being cared for, but also me (7).

3.7.2 Theme 2 – Importance of sharing information and getting answers to your questions

Women’s expectations were usually based on their knowledge about labour pain, the birthing facilities and the course of birth. Culture was an underlying factor in the women’s narrative. The lack of knowledge about how women who give birth are cared for in Iceland. Also, their previous experiences of giving birth and the experiences of other Polish women at home affected their expectations and often ignited anxiety and insecurity.

First I was worried, perhaps it would be worse that the doctor would not be attending the birth, but now, after this experience, I don't regret anything, I'm just happy, I got all the care I needed (6).

The women also thought the facilities and the service were better than they expected after hearing birth stories from women who gave birth in Poland. The women thought birth preparation to be beneficial but at the same time said it was hard to prepare for birth given its unique process and feeling. Some women attended a birth preparation course in Poland during pregnancy and they shared the feeling of a certain security before birth and had expectations regarding pain relief methods in labour for example. Still, some of them expressed a need for more information on coping strategies than provided to them during birth. They had experienced difficulties in communicating with the midwife and needed a translator, who was not offered or available. Having the same midwife at least during pregnancy was seen as a way to establish trust. This created a connection with the midwife during pregnancy, where the midwife was seen as having all the information, promoting better communication. This enabled them to get answers to their questions and the information needed to prepare for birth. One woman even traveled relatively far within the capital area to continue meeting the same midwife when she moved during the pregnancy *„it fills me with security to be with the same midwife, the one I have already met a few times, see the same face, you know, people, it is about communicating. It was important to me“ (3).* Women who heard stories during pregnancy of bad experiences from Poland, said it ignited fear and insecurity, while women who heard stories of good experiences felt it reduced anxiety towards birth.

The women I talked to beforehand, before the birth, who gave birth here in Iceland, they all told me that midwives in the maternity ward are all just angels and are just going to do what is best for me and I just need to relax and have no worries. And this will just go all as planned and this was really my experience. Yes, this was, this helped me to relax and reduce anxiety (7).

4. Discussion

The main finding of this study was that many women mentioned feeling insecure towards care in labour during their pregnancy, in particular regarding pain relief and communication. This continued as key concept in their experience of birth. The women's expectation towards intrapartum care was mainly built on insecurity, not only towards the labour process and level of pain experienced, but towards communication with the midwife, which was a frequent discussion in the analysis. Their expectations were largely shaped during pregnancy by other women's experience in Poland.

Good communication as well as establishing a good connection with the midwife was an overall need among all the migrant women in our study. Communication in the sense of transferring information

was related to language, where women without sufficient master of English thought of birth as a stressful experience. Women wanted a conversation with the midwife, information, and guidance to support them and the natural process of birth and to enable them to make informed decisions. They needed to experience a sense of control and were afraid that someone treated them just as bodies and did something to them without their consent, as indicated in a recent study [13]. Some women were planning on using translators during labour, but in some cases, they didn't because the midwife didn't take the initiative to offer them one, and the women did not ask because they did not want to be a nuisance. However, communication in a sense of sharing emotions, ideas and messages was even a stronger need in the women's narrative of important characteristics of a midwife. They expressed a need for a midwife who would stay with them during labour. A midwife who was kind and showed warmth, respect, and support in the care she provided. A midwife who helped them to feel empowered enough to make informed decisions. This is in line with previous studies on midwives' professionalism for woman-centred care [19-24]. Our findings on the need for caring relationships was also evident in an earlier study [8], where it was linked to the women's sources of strength and had a positive influence on their well-being and health. Woman-centered care in a cultural context supports women's needs, where the midwife creates a birthing atmosphere and forms a reciprocal relationship with the woman using grounded knowledge, as described in Berg et al's midwifery model of care (MiMo) [25].

The satisfaction women experienced regarding childbirth seems largely influenced by the extent to which they communicated with a caring midwife, how much they experienced control, and the extent to which they were able to influence the outcome of the birth experience. When the women were cared for in ways they defined as supportive, and had a caring communication with the midwife, they experienced comfort and well-being, even though they experienced physical pain, which is very much in line with Schuiling and Sampselle theory on comfort [26].

The importance of the women's partners support was evident even though they didn't all realise it during pregnancy. This was connected to both emotional support and physical support. The fact that the women had not all realized the importance of their partners' support in labour during pregnancy, gives health professionals a reason to discuss this matter in antenatal care.

Most of the women in this study were not keen on medical interventions, instead they were more focused on the natural process of childbirth. This is not in-line with how Icelandic doctors and midwives perceived Polish women in a previous qualitative study [27]. The women who planned for a non-pharmacological pain management during labour felt disappointment when not able to get the support to fulfil this wish, because of external conditions such as access and heavy midwifery workload. Still, the women's experience of intrapartum care and the overall service they received was better than what they had expected it to be.

4.1 Strengths, limitations, and future directions

To our knowledge, this is the first study on migrant women's expectations and experience of intrapartum midwifery care in Iceland. There were no selection bias related to events during birth in the second interviews as the women were enrolled before they had their birth experience. The longitudinal design of the study allowed us to capture a rich picture of the researched topic. The external transferability of the findings is limited to Polish women giving birth in Iceland, the biggest group of migrant women in the country. The quality of the data collected and reported is inevitably dependent on the interpretation through the lens of the authors, however we tried to limit the effect through critical discussions in the research teams, and including a relative outsider not from Iceland.

Implication for practice

A midwife's role is to assess the physical, emotional, social, and intellectual needs of all pregnant women and their families during childbirth and to provide care that aims to meet these needs. Our results indicate that perhaps the most valuable goal of midwives who prepare migrant women for childbirth is to provide them with a safe space to express their needs and formulate their goals, to promote their sense of control and experience of power, and the feeling that they have accomplished something at birth. This involves good communication, the use of translators if needed, and a woman-centered approach to care with respect and kindness. For midwives to be able to provide the care the women need and ask for, they have to have access to specially trained translators and inform migrant women about their right to translator during pregnancy. Continuity of care [8] and a provision of culturally sensitive maternal health services [17] have been highlighted to meet migrant women's needs, to help them find a sense of meaning in their new country and enhance positive outcomes of a healthy mother and baby. Continuity of care helps to empower women, and migrant women as a vulnerable group especially, assessing the needs of women and expectations regarding the childbirth process. During pregnancy it is important that midwives take advantage of the unique opportunity they have with migrant women to assist them in a way that they can express their needs and wishes and face the upcoming challenges related to the birth of their child. Midwives can encourage migrant women to have their partners with them during birth, inform them of the options available to them and encourage them to request an interpreter if needed. To ensure that care is appropriate, respectful and in partnership with migrant women, cultural competency and anti-discriminatory practice can be improved. This could be achieved through pre- and post-registration training of midwives and other clinical and non-clinical staff involved in the care of migrant women. A training that should cover both the social, clinical and psychological needs of migrant women as well as up to date information regarding policy and current socio-political population influences, as suggested by McNight et al. [28].

CONCLUSION

This study clearly acknowledges that migrant women's care situation in a new country is related to good communication and being connected with others [29]. This study identifies possible limitations in maternity care alongside factors that promote health and healthcare needs of migrant childbearing women in Iceland. It's our hope that this knowledge can positively affect the practice of midwives and other maternity care providers as well as the curriculum for future midwives in Iceland. By acknowledging migrant's women's diversity in experiences of security, knowledge, and personal values, we can implement policies that improve the way we take care of migrant women in maternity care and contribute to a positive childbirth experience in a foreign environment.

References

1. Halldorsdottir, S. og Karlsdottir, S.I. (1996). Empowerment or discouragement: women's experience of caring and uncaring encounters during childbirth. *Health Care Women International*, 17, 361-379.
2. Sigurdardottir VL, Gamble J, Gudmundsdottir B, Kristjansdottir H, Sveinsdottir H, Gottfredsdottir H. The predictive role of support in the birth experience: A longitudinal cohort study. *Women and Birth*. 2017 Dec 1;30(6):450-9. DOI:10.1016/j.wombi.2017.04.003
3. Downe S, Finlayson K, Oladapo OT, Bonet M, Gülmezoglu AM. What matters to women during childbirth: A systematic qualitative review. *PLoS One*. 2018 Apr 17;13(4):e0194906
4. Hodnett, E. (2002). Pain and women's satisfaction with the experience of childbirth: A systematic review. *American Journal of Obstetrics and Gynecology*, 186, 160-172.
5. Schuiling, K.D., (2013). Promoting comfort: A conceptual approach. In M. Avery (ed.), *Supporting a physiologic approach to pregnancy and birth a practical guide* (p.79-89). Malaysia: Wiley-Blackwell.
6. Statistics Iceland [Internet]. Special edition on immigrants in Iceland; 2019 [cited 2020 Feb]. Available from: <http://hagstofan.s3.amazonaws.com/media/public/2019/901e98bb-a182-4dc1-9059-261b7bea719b.pdf>
7. Statistics Iceland [Internet]. The numbers of immigrants continue to increase; 2019 [cited 2020 Jan 20]. Available from: https://hagstofa.is/utgafur/frettasafn/mannfoldi/innflytjendur/?fbclid=IwAR0RrgMnmVWSkIBR4F_L6cPwip3EU3_JvxXzeOpA7nqDuDIYRGrDYi_H74
8. Balaam MC, Akerjordet K, Lyberg A, Kaiser B, Schoening E, Fredriksen AM, et al. A qualitative review of migrant women's perceptions of their needs and experiences related to pregnancy and childbirth. *Journal of advanced nursing*. 2013;69(9):1919-309.
9. Billett H, Corona MV, Bohren MA. Women from migrant and refugee backgrounds' perceptions and experiences of the continuum of maternity care in Australia: A qualitative evidence synthesis. *Women and Birth*. 2021 Aug 21;35(4):327-339. DOI: 10.1016/j.wombi.2021.08.00510.
10. Kuipers YJ, Mestdagh E. The experiential knowledge of migrant women about vulnerability during pregnancy: A woman-centred mixed-methods study. *Women and Birth* 2022; 35(1):70-9. DOI: 10.1016/j.wombi.2021.03.004
11. Guðmundsdóttir EÝ, Gottfreðsdóttir H, Hálfðánsdóttir B, Nieuwenhuijze M, Gissler M, Einarsdóttir K. Challenges in migrant women's maternity care in a high-income country: A population-based cohort study of maternal and perinatal outcomes. *Acta Obstetrica et Gynecologica Scandinavica*. 2021 Sep;100(9):1665-77.

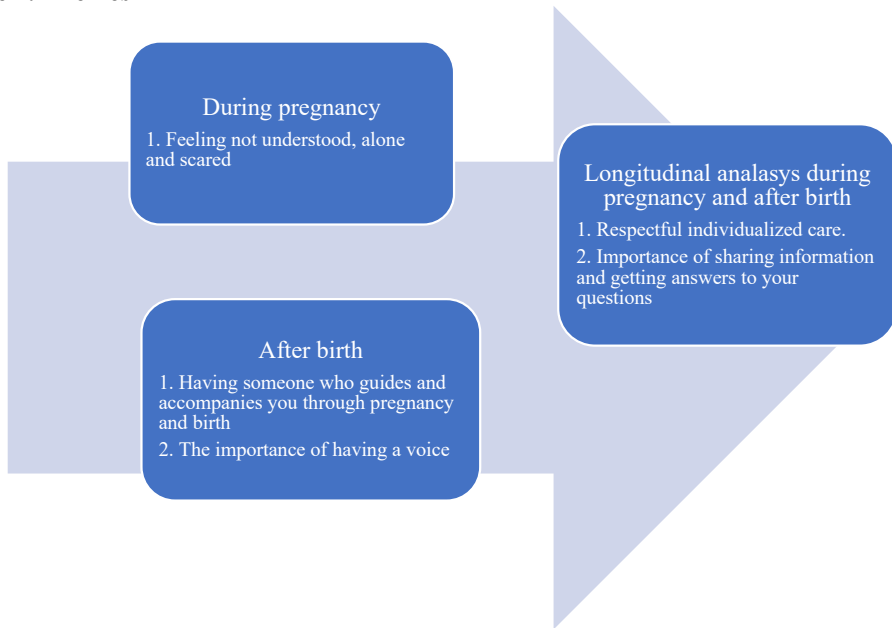
12. Guðmundsdóttir EY, Nieuwenhuijze M, Einarsdóttir K, Hálfhánsdóttir B, Gottfreðsdóttir H. Use of pain management in childbirth among migrant women in Iceland: A population-based cohort study. *Birth*. 2022 Feb 20.
13. Mangindin, E. L., Stoll, K., Cadée, F., Gottfreðsdóttir, H., & Swift, E. M. (2023). Respectful maternity care and women's autonomy in decision making in Iceland: Application of scale instruments in a cross-sectional survey. *Midwifery*, 103687.
14. Huddleston T. Migrant Integration Policy Index 2015: MIPEX 2015. CIDOB; 2015.
15. Patients' Rights Act, No. 74/1997 https://www.government.is/media/velferdarraduneyti-media/media/acrobat-enskar_sidur/Patients-Rights-Act-No-74-1997.pdf
16. Braun, V, Clarke, V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11 (4) (2019), pp. 589-597, [10.1080/2159676X.2019.1628806](https://doi.org/10.1080/2159676X.2019.1628806)
17. Benza S, Liamputtong P. Pregnancy, childbirth and motherhood: a metasynthesis of the lived experiences of immigrant women. *Midwifery*. 2014;30(6):575-84
18. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology*. 2006 Jan 1;3(2):77-101.
19. Halldorsdottir S, Karlsdottir SI. The primacy of the good midwife in midwifery services: an evolving theory of professionalism in midwifery. *Scandinavian journal of caring sciences*. 2011 Dec;25(4):806-17.
20. Butler M, Fraser DM, Murphy RJL. What are the essential competencies required of a midwife at the point of registration? *Midwifery* 2008; 24: 260– 9.
21. Lundgren I, Dahlberg K. Midwives' experience of the encounter with women and their pain during childbirth. *Midwifery* 2002; 18: 155– 64.
22. Byrom S, Downe S. “She sort of shines”: midwives' accounts of good midwifery and good leadership. *Midwifery* 2010; 26: 126– 37.
23. Nicolls L, Webb C. What makes a good midwife? An integrative review of methodologically-diverse research. *J Adv Nurs* 2006; 56: 414– 29.
24. Page L. One-to-one midwifery: restoring the “with woman” relationship in midwifery. *J Midwifery Womens Health* 2003; 48: 119– 25. DOI: [10.1016/s1526-9523\(02\)00425-7](https://doi.org/10.1016/s1526-9523(02)00425-7)
25. M. Berg, O. Olafsdottir, I. Lundgren. A Midwifery model of woman-centred childbirth care – in Swedish and Icelandic settings. *Sexual Reprod Healthcare*, 3 (2) (2012), pp. 79-87.
26. Schuiling, K.D. og Sampsele, C. (1999). Comfort in labor and midwifery art. *Journal of Nursing Scholarship*, 31, 77-81.
27. Símonardóttir S, Rúdólfssdóttir AG, Gottfreðsdóttir H. “We at least say we are equal”: Gender equality and class in healthcare professionals' discursive framing of migrant mothers. *Social Science & Medicine*. 2021 Jul 1;281:114089.
28. McKnight, P., Goodwin, L., & Kenyon, S. (2019). A systematic review of asylum-seeking women's views and experiences of UK maternity care. *Midwifery*.

29. Lyberg, A., Viken, B., Haruna, M., & Severinsson, E. (2012). Diversity and challenges in the management of maternity care for migrant women. *Journal of nursing management*, 20(2), 287-295.

Table 1. Characteristics of participants (N=8)

| Variable | n |
|--|----------|
| Maternal age at first interview | |
| 24-29 | 5 |
| 30-35 | 3 |
| Parity | |
| Nullipara | 5 |
| Multipara | 3 |
| Previous birth | |
| Poland | 1 |
| Iceland | 1 |
| Poland and Iceland | 1 |
| Gestation at first interview | |
| 34-37 weeks | 4 |
| 38-41 weeks | 4 |
| Time from birth at second interview | |
| 4-7 weeks | 5 |
| 8-11 weeks | 3 |
| Capital area residence | 8 |
| Reason for migration to Iceland | |
| Work | 5 |
| Wanted to live abroad | 3 |
| Duration of stay in Iceland | |
| 1-2 years | 3 |
| 3-4 years | 4 |
| 5-6 years | 1 |
| Married/cohabiting | 8 |
| Level of education | |
| Secondary education | 3 |
| Higher education | 5 |
| Employed/student | 7 |
| Level of birth service | |
| Tertiary | 8 |
| Co-morbidity | |
| Hypertensive disorder | 2 |
| Diabetes | 3 |
| Childbirth interventions | |
| Elective cesarean section | 1 |
| Induction of labour | 2 |
| Instrumental birth | 0 |
| Epidural | 4 |

Figure 1. Themes



Appendix A

Table S 1 Ascertainment and missing data for Study I outcome variables

| Study outcome | IMBR variable | ICD-10 code | NCSP code | Code description | Variables excluded/ missing |
|-----------------------|--|---------------------------|---|--|--|
| Induction of labour | Onset of labour | | | Elective caesarean delivery, spontaneous labour, induced labour | Missing 3.834 primiparous women (446 migrants) and 5.577 multiparous women (309 migrants). |
| | | O83.8 | | Induction of labour | |
| | | MASC00 | Induction by rupture of amniotic membrane | Women excluded if they had an elective caesarean: 1.340 primiparous women (186 migrants) and 4.855 multiparous women (307 migrants). | |
| | | MAXC02 | Prostaglandin induction of labour | | |
| | MAXC09 | Other induction of labour | | | |
| Amniotomy | | | MASC05 | Amniotomy during labour | Registration begun year 2006 Women excluded if they had an elective caesarean or an induction of labour: 8.120 primiparous women (9966 migrants) and 12.940 multiparous women (810 migrants). |
| Oxytocin augmentation | | | MAXC00 | Induction or stimulation of labour with oxytocin | Registration begun year 2006 Women excluded if they had an elective caesarean or an induction of labour: 8.120 primiparous women (9966 migrants) and 12.940 multiparous women (810 migrants). |
| Epidural | | | WAA307 | Acute epidural anaesthesia for delivery | Women excluded if they had an elective caesarean: 1.340 primiparous women (186 migrants) and 4.855 multiparous women (307 migrants). |
| | | | ZXXX30 | Epidural | |
| Perineum support | Perineum support (adequate support of the perineum and controlled progress of the baby's head) | | | yes/no | Registration begun year 2012. Women excluded if they had a caesarean and if they gave birth before 2012: 27.556 primiparous women (2.827 migrants) and 40.625 multiparous women (2.170 migrants). |
| Episiotomy | | | MAXX00 | Episiotomy | Registration begun year 2006. Women excluded if they had a caesarean: 5.726 primiparous women (700 migrants) and 7.716 multiparous women (569 migrants) |
| Instrumental birth | | O81.0 | | Low forceps delivery | Women excluded if they had an elective caesarean: 1.340 primiparous women (186 migrants) and 4.855 multiparous women (307 migrants). |
| | | O81.1 | | Mid-cavity forceps delivery | |

| | | | | | |
|------------------------|---------------------------------------|-------|--|---|---|
| | | O81.2 | | Mid-cavity forceps with rotation | |
| | | O81.3 | | Other and unspecified forceps delivery | |
| | | O81.4 | | Vacuum extractor delivery | |
| | | O81.5 | | Delivery by combination of forceps and vacuum extractor | |
| Elective caesarean | Onset of labour | | | Elective caesarean delivery, spontaneous labour, induced labour | |
| | | O82.0 | | Delivery by elective caesarean delivery | |
| Emergency caesarean | | O82.1 | | Delivery by emergency caesarean delivery | |
| OASI | | O70.2 | | Third degree perineal laceration during delivery | Women excluded if they had a caesarean: 5.726 primiparous women (700 migrants) and 7.716 multiparous women (569 migrants) |
| | | O70.3 | | Fourth degree perineal laceration during delivery | |
| Postpartum haemorrhage | | O72.0 | | Third-stage haemorrhage | |
| | | O72.1 | | Other immediate postpartum haemorrhage | |
| | | O72.2 | | Delayed and secondary postpartum haemorrhage | |
| | | O72.3 | | Postpartum coagulation defects | |
| Preterm | Gestational length, sonography, weeks | | | Gestational length in full weeks according to sonography | Missing 1.303 primiparous women (199 migrants) and 1.930 multiparous women (139 migrants) |
| 5 min Apgar < 7 | Apgar 5 min | | | | Stillbirths excluded: 133 primiparous women (17 migrants) and 155 multiparous women (11 migrants) Missing 1 Icelandic primiparous woman and 5 Icelandic multiparous women |
| NICU admission | Supervision of the newborn | | | NICU, maternity ward, doesn't apply | Registration begun year 2006. Stillbirths excluded: 133 primiparous women (17 migrants) and 155 multiparous women (11 migrants) |
| Perinatal mortality | The death of the newborn | | | Before birth, during birth, on the first day after birth, on day 2-7 after birth, on day 8-28 after birth, on day 29-365 after birth, not registered/does not apply | No cases for the death of a newborn on day 8-365 after birth. |
| Hypertensive disorder | | O10 | | Pre-existing hypertension complicating pregnancy, childbirth and the puerperium | |
| | | O11 | | Pre-eclampsia superimposed on chronic hypertension | |

| | | | | |
|-----------------------------|--|--------|--|---------------------|
| | | O13 | Gestational [pregnancy-induced] hypertension | |
| | | O14 | Pre-eclampsia | |
| | | O15.0 | Eclampsia in pregnancy | |
| | | O15.1 | Eclampsia in labour | |
| | | O16 | Unspecified maternal hypertension | |
| | | I10 | Essential (primary) hypertension | |
| Diabetes | | O24.0 | Pre-existing type 1 diabetes mellitus | |
| | | O24.1 | Pre-existing type 2 diabetes mellitus | |
| | | O24.4 | Diabetes mellitus arising in pregnancy | |
| | | O24.9 | Diabetes mellitus in pregnancy, unspecified | |
| | | E10 | Type 1 diabetes mellitus | |
| | | E11 | Type 2 diabetes mellitus | |
| | | E12 | Malnutrition-related diabetes mellitus | |
| | | E13 | Other specified diabetes mellitus | |
| | | E14 | Diabetes mellitus | |
| HIV | | Z21 | Asymptomatic human immunodeficiency virus [HIV] infection status | No cases for B20-24 |
| | | B20.8 | HIV disease resulting in other infectious and parasitic diseases | |
| Hepatitis | | Z22.5 | Carrier of viral hepatitis | |
| | | B18.1 | Chronic viral hepatitis B without delta-agent | |
| | | B18.2 | Chronic viral hepatitis C | |
| Symphysis pubis dysfunction | | O26.7 | Subluxation of symphysis (pubis) in pregnancy, childbirth and the puerperium | |
| Obesity | | E66.8 | Other obesity | |
| | | E66.9 | Obesity, unspecified | |
| | | E66.0 | Obesity due to excess calories | |
| | | E66.1 | Drug-induced obesity | |
| | | E66.2 | Extreme obesity with alveolar hypoventilation | |
| Thalassaemia | | D56 | Thalassaemia | |
| Tuberculosis | | A15-19 | Respiratory tuberculosis, bacteriologically and histologically confirmed | No cases for A15-19 |

Appendix B

Table S 2 Background characteristics of primiparous and multiparous migrant women with missing data on citizenship who gave birth to a singleton in Iceland during the study period (1997-2018)^a

| Characteristics | | Migrant primiparous women, missing citizenship (n=177) | Migrant multiparous women, missing citizenship (n=173) |
|---|---------|--|--|
| Maternal age at birth | n(mean) | 159 (27.5)*** | 167 (29.8)** |
| ≤19 | n(%) | 9 (5.7%)** | 1 (0.6)* |
| 20-24 | n(%) | 46 (28.9%)** | 26 (15.6)* |
| 25-29 | n(%) | 50 (31.4%)** | 51 (30.5)* |
| 30-34 | n(%) | 36 (22.6%)** | 58 (34.7)* |
| 35-39 | n(%) | 13 (8.2%)** | 24 (14.4)* |
| ≥40 | n(%) | 5 (3.1%)** | 7 (4.2)* |
| Data missing | n(%) | 18 (10.2%) | 6 (3.5) |
| Married/cohabiting | n(%) | 108 (78.8%***) | 129 (85.4)*** |
| Data missing | n(%) | 40 (22.6%) | 22 (12.7) |
| Capital area residence | n(%) | 122 (68.9%) | 116 (67.1%) |
| Data missing | n(%) | 19 (10.7) | 9 (5.2) |
| Employed/student | n(%) | 105 (59.3) | 101 (58.4) |
| Year of giving birth | | | |
| 1997-2006 | n(%) | 75 (42.4) | 53 (30.6)*** |
| 2007-2018 | n(%) | 102 (57.6) | 120 (69.4)*** |
| Data missing | n(%) | 0 (0) | 0 (0) |
| Parity | n(mean) | - | 173 (1.5) |
| 1 | n(%) | - | 119 (68.8)** |
| 2 | n(%) | - | 33 (19.1)** |
| ≥3 | n(%) | - | 21 (12.1)** |
| Data missing | n(%) | - | 0 (0) |
| Previous caesarean section | n(%) | - | 1 (0.6) |
| Antenatal care visits | n(%) | 177 (9.0)*** | 173 (8.8)*** |
| 0 | n(mean) | 8 (4.5)*** | 2 (1.2)*** |
| 1-3 | n(%) | 8 (4.5)*** | 4 (2.3)*** |
| 4-8 | n(%) | 54 (30.5)*** | 80 (46.2)*** |
| 9-11 | n(%) | 65 (36.7)*** | 61 (35.3)*** |
| ≥12 | n(%) | 42 (23.7)*** | 26 (15.0)*** |
| Data missing | n(%) | 0 (0) | 0 (0) |
| Gestation | n(%) | 165 (39.2) | 160 (39.2)* |
| ≤36 ⁰⁻⁶ w | n(%) | 15 (9.1) | 8 (5.0) |
| 37 ⁰⁻⁶ w-41 ⁰⁻⁶ w | n(%) | 142 (86.1) | 149 (93.1) |
| ≥42 ⁰⁻⁶ w | n(%) | 8 (4.8) | 3 (1.9) |
| Data missing | n(%) | 12 (6.8) | 13 (7.5) |
| Level of birth services | n(%) | | |
| Primary | n(%) | 11 (6.2) | 12 (6.9)* |
| Secondary | n(%) | 8 (4.5) | 11 (6.4)* |
| Tertiary | n(%) | 158 (89.3) | 150 (86.7)* |
| Data missing | n(%) | 0 (0) | 0 (0) |
| Co-morbidity | n(%) | | |
| Hypertensive disorder | n(%) | 2 (1.1)* | 3 (1.7) |
| Diabetes | n(%) | 6 (3.4) | 9 (5.2) |
| HIV ^b | n(%) | 0 (0) | 0 (0) |
| Hepatitis ^b | n(%) | 1 (0.6) | 1 (0.6) |
| Symphysis pubis dysfunction | n(%) | 2 (1.1) | 7 (4) |
| Thalassaemia ^b | n(%) | 0 (0) | 0 (0) |
| Obesity | n(%) | 2 (1.1) | 5 (2.9) |

* $p < .05$ ** $p < .01$ *** $p < .001$

^ap-values are for comparison of each group of migrant women with the group of Icelandic women, χ^2

^bDenominators vary because of missing values.

^bIf Chi-square tests was not valid due to >20% cells have exp.count less than 5, Fisher exact test was used.

Appendix C

Table S 3 Prevalence (%) of, and crude (OR) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) and all numbers analysed for maternal and perinatal outcome of primiparous and multiparous migrant women with missing data on citizenship who gave birth to a singleton in Iceland during the study period (1997-2018)^a

| | Migrant women, missing citizenship, Primiparas (n=177) | | | Migrant women, missing citizenship, Multiparas (n=173) | | |
|-------------------------------------|--|-------------------------|---|--|--|--|
| | n/N (%) | OR | n migrants/ N total in the crude OR analysis | aOR ⁱ | n migrants/ N total in the aOR analysis | n migrants/N total in the aOR analysis |
| CHILD BIRTH INTERVENTION | | | | | | |
| Induction of labour ^b | 28/146 (19.2) | 0.90 (0.60-1.36) | 146/28746 | 1.14 (0.70-1.88) | 66/26244 | 21/131 (16) |
| Amniotomy ^{cd} | 23/68 (33.8) | 0.62 (0.69-1.88) | 68/11576 | 1.48 (0.81-2.69) | 33/10399 | 2/175 (28) |
| Oxytocin augmentation ^{cd} | 2/168 (30.9) | 0.90 (0.54-1.51) | 68/11576 | - | -/10399 | 14/75 (18.7) |
| Epidural ^b | 74/146 (50.7) | 1.00 (0.72-1.39) | 146/28746 | 1.04 (0.70-1.54) | 66/26244 | 30/131 (22.9%) |
| Perineum support ^{cd} | 23/40 (57.5) | 0.78 (0.41-1.45) | 40/8366 | 0.89 (0.38-2.09) | 18/7723 | 31/42 (73.8)* |
| Episiotomy ^{cd} | 15/96 (15.6) | 0.86 (0.50-1.50) | 96/16098 | 0.50 (0.24-1.05) | 52/14147 | 1/114 (0.9) |
| Instrumental delivery ^b | 29/146 (19.9) | 1.43 (0.95-2.15) | 146/28746 | 1.35 (0.83-2.20) | 66/22148 | 1/131 (0.8) |
| Elective caesarean | 6/177 (3.4) | 0.97 (0.43-2.19) | 177/33232 | 1.04 (0.43-2.54) | 87/29893 | 11/173 (6.4) |
| Emergency caesarean | 19/146 (13) | 0.96 (0.59-1.55) | 146/28746 | 0.83 (0.45-1.53) | 66/26244 | 7/131 (5.3) |
| MATERNAL OUTCOMES | | | | | | |
| OASI ^f | 4/150 (2.7)** | 0.28 (0.10-0.74) | 150/27543 | 0.26 (0.08-0.81) | 75/24811 | 2/154 (1.3) |
| Postpartum haemorrhage | 13/177 (7.3) | 1.09 (0.62-1.92) | 177/33232 | 1.04 (0.54-2.01) | 87/29893 | 14/173 (8.1)* |
| NEONATAL OUTCOMES | | | | | | |
| Preterm | 15/165 (9.1)* | 1.72 (1.01-2.93) | 165/32116 | 0.33 (0.13-0.85) | 87/29893 | 8/160 (5.0) |
| 5 min Apgar <7 ^g | 4/177 (2.3) | 0.69 (0.26-1.87) | 177/33115 | 0.73 (0.23-2.32) | 87/29793 | 4/172 (2.3) |
| NICU admission ^{de} | 12/177 (6.8) | 1.04 (0.58-1.87) | 177/33116 | 0.90 (0.30-2.64) | 33/10388 | 8/172 (4.7) |
| Perinatal mortality ^h | 0/177 (0) | 0.00 | 177/33232 | 0.00 | 87/29893 | 1/173 (0.6) |
| | | | | | | 1.59 (0.22-11.44) |
| | | | | | | 1.85 (1.07-3.20) |
| | | | | | | 1.37 (0.67-2.79) |
| | | | | | | 1.36 (0.51-3.68) |
| | | | | | | 1.26 (0.62-2.56) |
| | | | | | | 1.31 (0.10-16.77) |
| | | | | | | 0.82 (0.20-3.35) |
| | | | | | | 1.77 (0.97-3.23) |
| | | | | | | 0.66 (0.26-1.68) |
| | | | | | | 0.96 (0.24-3.89) |
| | | | | | | 0.67 (0.16-2.83) |
| | | | | | | 1.31 (0.10-16.77) |

* P < .05 ** P < .01 *** P < .001

Statistical significant findings for crude and adjusted ORs are marked in bold

^aDenominators vary because of missing values and exclusion criteria (listed in Supporting Information Table S3)

^bAmong women with planned vaginal birth (women excluded if they had an elective caesarean)

^cAmong women with spontaneous onset of labour (women excluded if they had an elective caesarean and an induction of labour)

^dRegistration begun year 2006

^eRegistration begun year 2012

^fAmong women with vaginal birth (women excluded if they had a caesarean)

p-values are for comparison of each group of migrant women with the group of Icelandic women.^{x2}

^gAmong live births (newborn excluded if stillborn)

^hIf Chi-square tests was not valid due to >20% cells have expected count less than 5, Fisher exact test was used

ⁱAdjustments were made for age, parity, gestation age (expect for the variable preterm), number of antenatal visits, occupation, birthyear, residence, marital status, level of birth services, hypertensive disorder, diabetes, HIV, hepatitis, thalassemia, obesity, symphysis pubis dysfunction and previous cesarean section

Appendix D

Table S 4 Ascertainment for Study II outcome variables.

| STUDY OUTCOME | NCSP CODE | ATC CODE | NIC CODE | CODE DESCRIPTION |
|------------------------------------|-----------|----------|----------|---|
| NON-PHARMACOLOGICAL METHODS | | | | |
| RELAXATION | | | 6040 | Use of techniques to encourage and elicit relaxation for the purpose of decreasing undesirable signs and symptoms such as pain, muscle tension, or anxiety |
| MASSAGE | | | 1480 | Stimulation of the skin and underlying tissues with varying degrees of hand pressure to decrease pain, produce relaxation, and/or improve circulation |
| ACUPUNCTURE | AXXXA00 | | | Acupuncture |
| STERILE WATER INJECTION | | | 2317 | Preparing and giving medications via the subcutaneous route |
| WARM/COLD PACKS | | | 1380 | Stimulation of the skin and underlying tissues with heat or cold for the purpose of decreasing pain, muscle spasms, or inflammation |
| TENS | | | 1540 | Stimulation of skin and underlying tissues with controlled, low-voltage electrical vibration via electrodes |
| SHOWER/ BATH | | | 1340 | Stimulation of the skin and underlying tissues for the purpose of decreasing undesirable signs and symptoms such as pain, muscle spasm, or inflammation |
| AROMATHERAPY ⁶ | | | 1330 | Administration of essential oils through massage, topical ointments or lotions, baths, inhalation, douches, or compresses (hot or cold) to calm and soothe, provide pain relief, and enhance relaxation and comfort |
| PHARMACOLOGICAL METHODS | | | | |
| PETHIDINE | | N02AB02 | | Phenylpiperidine derivatives |
| NITROUS OXIDE INHALATION | WAA740 | | | Nitrogen oxide therapy |
| PUDENTAL BLOCK | WAA230 | | | Plexus blockade of nervus pudendus |
| EPIDURAL ANESTHESIA | WAA307 | | | Acute epidural anaesthesia for delivery |
| | ZXXX30 | | | Epidural |

Appendix E

Information sheet for Polish migrant women for Study III



SCHOOL OF HEALTH SCIENCES

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Dokument informacyjny dla imigrantek

Stan zdrowia imigrantek rodzących dzieci na Islandii: ich dostęp do systemu opieki zdrowotnej oraz doświadczenia związane z opieką położniczą.

Droga Adresatko,

Niniejszym zapraszamy Cię do udziału w badaniu dotyczącym stanu zdrowia imigrantek rodzących dzieci na Islandii: ich dostępu do systemu opieki zdrowotnej oraz ich doświadczeń związanych z opieką położniczą. Dr Helga Gottfreðsdóttir, położna i wykładowca, jest kierownikiem zespołu badawczego. Badanie otrzymało dofinansowanie z Islandzkiego Funduszu Badawczego (Rannís), numer 196218-051.

Założenia/ Cel badania

Ogólnym celem tego badania jest analiza dostępu do opieki położniczej i korzystania z niej, a także wynik ciąży, kobiet z mniejszości etnicznych, w islandzkim systemie opieki zdrowotnej.

Uczestniczki badania

Położne pracujące w zespole opieki okołoporodowej skontaktują się z kobietami / uczestniczkami badania, będącymi w ciąży. Przedstawiają prowadzone badania i zapytują o zgodę na przekazanie ich danych kontaktowych zespołowi badawczemu. Ankieter / lub w razie potrzeby tłumacz, skontaktuje się z kobietami będącymi w ciąży, w celu przekazania szczegółowych informacji na temat badania.

Na czym polega uczestnictwo w badaniu?

Jeśli wyrazisz zgodę na udział w tym badaniu, będzie on polegał na udziale w dwóch wywiadach:

- a. Pierwszy wywiad odbędzie się podczas ciąży.
- b. Drugi wywiad odbędzie się po urodzeniu dziecka.

Wywiad zostanie nagrany na taśmie, a czas jego trwania to jedna godzina.

Wywiad zostanie przeprowadzony przez wyszkolonego tłumacza, mówiącego w Twoim języku.

Niedogodności i korzyści wynikające z uczestnictwa w badaniu

Udział w badaniu nie niesie za sobą, żadnych bezpośrednich korzyści dla uczestników, poza możliwością wzięcia udziału w badaniu, które potencjalnie poprawi zrozumienie doświadczeń imigrantek w zakresie opieki okołoporodowej, a także ich dostępu do systemu opieki zdrowotnej. Dokładniejsze zrozumienie i wiedza na temat kobiet reprezentujących mniejszości narodowe na Islandii będzie korzystna dla polityki i praktyki w tym dziale opieki zdrowotnej.

Uczestniczki badania będą miały również okazję podzielić się swoimi doświadczeniami oraz spostrzeżeniami, a także przedstawić swoje przemyślenia i odczucia względem opieki okołoporodowej na Islandii. Istnieje ryzyko wywołania niepokoju u uczestniczek badania, na skutek bolesnych wspomnień lub innych zdarzeń w trakcie przeprowadzania wywiadu. Nasz ankieter dołoży starań, aby wywiady zostały przeprowadzone w cichym otoczeniu, a my postaramy się stworzyć przestrzeń, która będzie postrzegana, jako niezależna kulturowo. Uczestniczki mogą odmówić odpowiedzi na konkretne pytania oraz przerwać badanie w dowolnym momencie, bez potrzeby wyjaśniania przyczyn swojej decyzji. W przypadku nagromadzenia się negatywnych emocji lub poczucia dyskomfortu w skutek przeprowadzonego wywiadu, badana może skontaktować się z Valgerður Lisą Sigurðardóttir, położną, konsultantką specjalizującą się w okołoporodowym zdrowiu psychicznym kobiet na oddziale położniczym Krajowego Szpitala Uniwersyteckiego (nr tel.: 824-5391), która bezpłatnie porozmawia z uczestniczką badania o poprawie jej samopoczucia.

W ramach zachęty oraz podziękowania za czas poświęcony na udział w takim badaniu, uczestniczka otrzyma wynagrodzenie w wysokości 5000 koron islandzkich.

Poufność i anonimowość

Zespół badawczy zobowiązuje się do zachowania anonimowości badania oraz poufności względem uzyskanych informacji. Wszystkie dane zawarte w niniejszym badaniu traktowane będą, jako poufne. Przesyłając dane z badania nie ma możliwości śledzenia żadnych informacji. Dozwolone jest odmówienie wzięcia udziału lub zrezygnowanie z udziału w badaniu na dowolnym etapie, bez podania przyczyny oraz bez żadnych konsekwencji dla jakiegokolwiek innej terapii lub leczenia.