Narrative Review
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Disparities in Obstetric and Anaesthetic Care Between Migrant and Native Populations in High-Income Countries: A Narrative Review

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Abstract

Objective. This narrative review aimed to investigate the potential differences in antenatal care provision, perinatal outcomes, and administration of obstetric neuraxial analgesia between migrant women and their native counterparts in high-income countries. **Methods.** Between March and July 2024, we searched four electronic databases through Ovid and PubMed: Medline, Embase, Global Health, and Maternity and Infant Care. The search terms used included "migrant", "refugee", "asylum seeker", "perinatal", "antenatal", "pregnancy", "neonate", "obstetric anaesthesia", "neuraxial analgesia", and "outcome". We included peer-reviewed articles published in English that presented data on the provision of antenatal and perinatal care, as well as the administration of obstetric neuraxial analgesia to refugee mothers who migrated to high-income countries. **Results.** Among the 795 screened records, 41 studies met the inclusion criteria. Of these, ten focused on obstetric neuraxial analgesia administration, while the remaining studies highlighted the differences in antenatal care and perinatal outcomes. **Conclusion.** Access to antenatal care, utilisation of neuraxial analgesia, and perinatal and neonatal outcomes for migrant women differ from those of their native counterparts, reflecting the significant challenges encountered during the perinatal period.

Key Words: Antenatal Care ▪ Immigrants ▪ Refugees ▪ Obstetric Anaesthesia ▪ Perinatal Health.

Introduction

The significant influx of refugees resettling or seeking asylum due to poor living conditions, social conflict, and/or war has turned migration into a global health concern. Even when host countries implement supportive policies for the well-being of immigrant populations, displacement from native countries poses substantial risks to individuals and families, including their health (1). Refugee women, in particular, represent an exceptionally vulnerable group regarding adverse reproductive outcomes (1).

Antenatal care is essential for monitoring the health of both the pregnant individual and foetus, identifying potential complications, and enabling timely medical interventions (1). Although it plays a vital role in global maternity care services, antenatal care faces substantial challenges in refugee populations. Factors contributing to these challenges include language barriers, limited access to healthcare, inadequate insurance coverage, socioeconomic hardships, nutritional deficiencies, and cultural differences. Thus, insufficient provision of antenatal care is linked to adverse obstetric and neonatal health outcomes (2).

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According to the World Bank (2021) (3), over 3,500,000 refugees have resettled in high-income countries (4), where healthcare provision is generally expected to be superior to that in middle- and low-income countries. The delivery of high-quality antenatal and perinatal care for migrants in these high-income settings could potentially reduce adverse obstetric and neonatal outcomes in this population. However, a recent study in the Netherlands reported a higher rate of perinatal mortality among asylum seekers compared to native Dutch women (5). Similarly, a comprehensive Swedish study reviewing migrant women's experiences of maternity care across various European countries found that migrants encountered higher risks of poor self-rated health, gestational diabetes, preterm birth, stillbirth, and low birthweight infants (6).

Conversely, numerous studies have identified a phenomenon known as the "healthy-migrant effect" or the "migrant health paradox", wherein migrants exhibit better health outcomes than the host population with similar demographic and socioeconomic characteristics (7-9). The healthy migrant effect is paradoxical because immigrants, who are associated with low socioeconomic status, disadvantaged lifestyles, and poor antenatal care, are expected to experience more adverse birth outcomes than native-born individuals. However, the majority of current evidence, as cited, indicates the contrary (7-9).

Migrants are defined as "individuals who relocate their place of residence, regardless of the reason for their migration or their legal status". In contrast, refugees or asylum seekers are described as "displaced persons in need of international protection due to fears of persecution, war, violence, or other conditions that significantly disrupt public order" (10, 11). This literature review aims to provide a thorough synthesis of the evidence regarding perinatal care for migrants, refugees, and asylum seekers—collectively referred to as "migrants"—in high-income countries. The review evaluates existing data on maternity care related to obstetric outcomes among immigrants and highlights barriers affecting the provision of antenatal care worldwide.

This study aimed to investigate whether access to antenatal care, use of labour neuraxial analgesia, and perinatal and neonatal outcomes differ between migrant women and their native counterparts in high-income countries.

Materials and Methods

Between March and July 2024, we searched four electronic databases through Ovid and PubMed: Medline, Embase, Global Health, and Maternity and Infant Care. The search terms were "migrant", "refugee", "asylum seeker", "perinatal", "antenatal", "pregnancy", "neonate", "obstetric anaesthesia", "neuraxial analgesia", and "outcome". Table 1 provides details of the search strategy and search terms used. To verify the quality of the article, both the six-point Scale for the Assessment of Narrative Review Articles (SANRA) and a seven-item checklist were utilised. The checklist facilitated the identification of key questions concerning the work, the literature search process, and its quality. It also enabled the assessment of the article as a narrative review, highlighting its implications for future research and clinical practice. The application of the SANRA scale ensured the proper structure of the article by incorporating essential components: presentation of the review's meaning and purpose, description of the literature search, references to key issues, scientific reasoning, and presentation of relevant data pertaining to the final points of the article.

We included articles published in peer-reviewed English-language journals between 1996 and 2024 that provided data on antenatal care provision, obstetric neuraxial analgesia administration, and described perinatal and neonatal outcomes of infants born to refugee mothers who migrated to high-income countries. There were no restrictions based on the time the migrants had been in the receiving country. For inclusion in this review, we identified observational studies (including cohort, case-control, and cross-sectional studies) that offered comparative analyses of outcomes between migrant and non-migrant women (Tables 2 and 3), as well as narrative reviews. Furthermore, we examined

the reference lists of pertinent papers to identify additional studies that met the inclusion criteria but were missed during the search process.

In our database search strategy, we also identified and extracted the number of publications that provided data that had not yet been published as full-text articles in scientific journals but were only available in abstracts. Publications were excluded if they were not in English, if they focused on refugee women who migrated to low- or middle-income countries, or if they analysed only obstetric outcomes of parturient refugees or solely neonatal outcomes of infants born to refugee mothers who migrated to high-income countries.

Results

The quality of narrative reviews can be assessed using the SANRA scale and six quality criteria metrics: (1) justification of the article's importance for the readership, (2) statement of concrete aims or formulation of questions, (3) description of the literature search, (4) referencing, (5) scientific reasoning, and (6) appropriate presentation of data. The first two criteria were satisfied in the Introduction and aim of the study, whereas the third and fourth criteria are further addressed in the literature search and study selection. The fourth criterion is satisfied by the statements

Table 1. Database Search Terms

Database searches through OVID: Medline, Embase, Global Health, Maternity and Infant Care – March 2024
Pregnancy AND immigrants AND outcomes
Pregnancy AND refugees AND outcomes
Pregnancy AND asylum seekers AND outcomes
Pregnancy AND immigrants AND outcomes and Pregnancy AND immigrants AND outcomes and Pregnancy AND asylum seekers AND outcomes
Antenatal care AND refugees
Antenatal care AND immigrants
Antenatal care AND asylum seekers
Antenatal care AND refugees
Perinatal care AND refugees + Antenatal care AND immigrants + Antenatal care AND asylum seekers
Perinatal care AND refugees
Perinatal care AND immigrants
Perinatal care AND asylum seekers
Perinatal care AND refugees + Perinatal care AND immigrants + Perinatal care AND immigrants
Obstetric anaesthesia AND immigrants
Obstetric anaesthesia AND refugees
Obstetric anaesthesia AND asylum seekers
Obstetric anaesthesia AND immigrants + Obstetric anaesthesia AND refugees + Obstetric anaesthesia AND asylum seekers
Neuraxial analgesia AND immigrants
Neuraxial analgesia AND refugees
Neuraxial analgesia AND asylum seekers + Neuraxial analgesia AND asylum seekers
Neuraxial analgesia AND immigrants+ Neuraxial analgesia AND refugees
PubMed searches – April 2024
Pregnancy AND outcomes AND refugees OR asylum seekers OR migrants
Antenatal care AND refugees OR asylum seekers OR migrants
Perinatal care AND refugees OR asylum seekers OR migrants
Obstetric anaesthesia AND refugees OR asylum seekers OR migrants
Neuraxial analgesia AND refugees OR asylum seekers OR migrants

Table 2. Overview of the 31 Studies Examining Perinatal Outcomes Among Migrant Women in High-Income Countries*

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Agbemenu et al. (12)	2019	To compare: (1) Pre-pregnancy health and prenatal behaviour; (2) Prenatal history and utilisation of prenatal care; and (3) Labour and birth outcomes among African refugee women, U.S.-born Black women, and U.S.-born White women.	Retrospective cohort.	Burundi, Democratic Republic of the Congo, Eritrea, Rwanda, and Somalia.	USA	789 African refugees, 17,487 Black women, and 59,615 White women.	The healthy immigrant effect extends to reproductive health in African refugee women, even with inadequate prenatal care: 1. Fewer maternal medical risk factors: 34.5% (P<0.001) vs. U.S.-born Black women (41.3%) and U.S.-born White women (44.0%). 2. Inadequate prenatal care: 27.3% of refugees vs. 11.8% of White women, 23.9% of Black women (P<0.001). 3. More vaginal births: 73.4% refugees; 65.3% U.S.-born White; 66.6% U.S.-born Black. 4. Fewer caesarean sections: 13.2% refugees; 19.1% U.S.-born White; 18.3% U.S.-born Black.
Akselsson et al. (39)	2020	To compare pregnancy outcomes between women born in Somalia and those born in Sweden.	Population-based study.	Somalia	Sweden	39,865 women with singleton pregnancies: 623 from Somalia and 26,485 from Sweden.	Women born in Somalia had a higher risk of adverse pregnancy outcomes compared to those born in Sweden. Caesarean sections were less common among Somali women (16.7% vs. 19.2%), but emergency caesareans were more frequent (10.1% vs. 8.8%).
Ammoura et al. (51)	2021	1) To document the perinatal data of refugee women at Charité Hospital in Berlin; 2) To assess potential differences in prenatal, perinatal, and postnatal outcomes compared to those of indigenous women.	Retrospective comparative study.	Syria, Serbia, Vietnam, and Afghanistan.	Germany	907 refugee women and 928 infants, including 21 twin pregnancies, were part of the 758,783 births recorded in the 2016 German Federal obstetric data.	The rates of premature birth, stillbirth, and congenital malformations were higher among pregnant refugee women, despite their younger average age.
Auger et al. (49)	2020	To investigate disparities in stillbirth rates between Arab women and the French and English majority populations of women in Quebec, Canada.	Retrospective study of all births in Quebec from 1981 through 2015.	Arab women.	The French and English majority of women in Quebec, Canada.	Of the 13,452 stillbirths in the study, 283 (2.1%) were among women with a specific mother tongue, 229 (1.7%) were among fathers with the same mother tongue, and 181 (1.3%) were among parents who used that language at home.	Women whose first language was Arabic had a higher rate of stillbirths caused by congenital anomalies, pregnancy terminations, and undetermined factors compared to those with French or English as their mother tongue. Among Arabic speakers, 18.8% of stillbirths were due to congenital anomalies, versus 12.9% among French or English speakers.

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Bakken et al. (40)	2015	To compare obstetric outcomes between women from conflict-zone countries and ethnic Norwegian women who gave birth in a low-risk setting.	Population-based observational study.	Somalia, Iraq, Afghanistan, and Kosovo.	Norway	7408 women.	Somali women faced higher risks for adverse obstetric outcomes compared to ethnic Norwegians. They had increased odds ratios (OR) for emergency caesarean section (1.81), post-term birth (1.93), meconium-stained liquor (2.39), and small-for-gestational-age infants (3.97). Conversely, they had lower ORs for epidural analgesia (0.40) and large-for-gestational-age infants (0.32).
Bakken et al. (41)	2015	To compare obstetric outcomes between immigrants and ethnic Norwegians in a low-risk birth setting.	Population-based observational study.	Immigrants of African and Asian descent originating from 141 countries.	Norway	11,540 women.	Compared to Norwegians, women from East, Southeast, and Central Asia faced higher risks of operative vaginal delivery, postpartum bleeding, and low Apgar scores. African women had increased risks for post-term birth, meconium-stained liquor, episiotomy, operative vaginal delivery, emergency caesarean delivery, postpartum bleeding, low Apgar scores, and low birthweight. Women from South and Western Asia had a higher risk of low birthweight babies.
Bastola et al. (42)	2019	To compare the mode of delivery, any complications during delivery, and the use of pain medication during delivery.	Retrospective cohort.	Somali, Kurdish, and Russian.	Finnish women.	Russian (N=318), Somali (N=583), and Kurdish (N=373) origin, along with 243 women from the general population (reference group) who had given birth in Finland.	Migrant Somali women experienced more delivery complications compared to Finnish women. Russian women had lower odds of caesarean delivery (OR 0.49; CI 0.29-0.82), while Somali and Kurdish women's odds did not differ from the reference group. Somali women faced a higher risk of any delivery complications (OR 1.62; CI 1.03-2.55) than the reference group.
Bastola et al. (46)	2020	To investigate differences in caesarean delivery and neonatal outcomes.	Retrospective cohort.	Women were classified into nine regions: Western high-income countries, Eastern Europe, Russia/USSR, South Asia, East Asia, Sub-Saharan Africa, Middle East/ North Africa, and Latin America/ Caribbean.	Finland	92% of the women were Finnish, while 8% were migrants.	Compared with Finnish women, women of Sub-Saharan African, South Asian, and East Asian origin were at greater risk of emergency caesarean delivery, preterm birth, low birthweight, and lower five-minute Apgar scores for newborns. Latin American/Caribbean-origin women were at increased risk of both elective and emergency caesarean delivery and lower five-minute Apgar scores compared with Finnish women. Women of Russian/former USSR origin overall had a lower risk of caesarean delivery and poor neonatal outcomes compared with Finnish women.

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Bastola et al. (25)	2020	To compare the prevalence of gestational diabetes and hypertensive disorders.	Retrospective cohort.	Russian-, Somali-, and Kurdish-origin women.	Finnish women.	Russian (N=318), Somali (N=583), Kurdish (N=373) General population (N=243).	Women of Kurdish origin were more likely to develop gestational diabetes. When adjusted for confounders, Kurdish women had two-fold odds for gestational diabetes (odds ratio = 1.98; 95% confidence interval = 1.20-3.32) compared with the general population, but the odds for hypertensive disorders did not differ between groups.
Bastola et al. (24)	2022	To study the prevalence of hypertensive disorders of pregnancy.	Retrospective cohort.	Women were classified into nine regional categories: Western Europe/ North America/ Oceania (later referred to as Western high-income countries), Eastern Europe, Russia and the former Union of Soviet Socialist Republics (USSR), South Asia, East Asia, Sub-Saharan Africa, Middle East/North Africa, and Latin America/ Caribbean.	Finnish	Women of Finnish origin represented nearly 92% (N=350,548), while women of migrant origin comprised 8% (N=31,454).	Hypertensive disorders of pregnancy ranged from 1.3% in East Asian women to 4.2% in Sub-Saharan African women, compared with 4.6% in Finnish women. After adjusting for confounders, migrant women had a lower risk than Finnish women, except for those from Sub-Saharan Africa.
Biro et al. (17)	2017	To investigate the correlation between maternal refugee status and severe foetal growth restriction in singleton pregnancies delivered after 40 weeks of gestation.	Retrospective cohort.	Afghanistan, Bhutan, Burma, Burundi, Democratic Republic of the Congo, Guinea, Iraq, Liberia, Rwanda, Sierra Leone, and Sudan.	Australia; non-refugee women.	1,547 refugees; 18,020 non-refugee women.	Refugee-background mothers are more likely to give birth to severely growth-restricted babies post-40 weeks (adjusted odds ratio 2.52; 95% CI: 1.44-4.42). They have higher rates of spontaneous labour (69.7% vs. 60.06%) and lower rates of induced labour (19.7% vs. 25.0%) compared to non-refugee mothers (p<0.001). They are also less likely to have instrumental (10.2% vs. 14.8%) or emergency caesarean deliveries (14.3% vs. 15.7%) (P<0.001) and severe foetal growth restriction (3.9% vs. 4.4%, P<0.01).
Bozorg-mehr et al. (20)	2018	To compare asylum seekers and residents regarding high-risk pregnancies, abortive outcomes/ stillbirths, maternal complications, neonatal complications, and caesarean sections.	Cross-sectional.	Asylum seekers.	German residents.	19,864 women; 2.9% (n=569) were asylum seekers.	Asylum-seeking women have a higher risk of abortive outcomes, stillbirths, and postnatal complications. The adjusted odds for high-risk pregnancy conditions (OR=0.76, 95% CI: 0.63-0.91, p < 0.0001), caesarean sections (OR=0.84, 95% CI: 0.66-1.07, P=0.17), and perinatal complications (OR=0.65, 95% CI: 0.55-0.78, P<0.0001) were lower. However, the odds for abortive outcomes/stillbirths (OR=1.58, 95% CI: 1.11-2.20, p=0.01) and postnatal complications (OR=1.80, 95% CI: 0.93-3.19, P=0.06) were higher compared to residents.

Continuation of Table 2.

Study	Publication year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Florian et al. (50)	2023	To investigate whether the health advantage of higher birthweight of children of immigrants relative to children of natives is transferred from parents to children.	Comparative observational cohort.	Data from nine birth cohorts in the LifeCycle Project: Etude Longitudinale Française depuis l'Enfance-France (N=12,494), Raine Study-Australia (N=2,283), Born in Bradford-UK (N=4,132), Amsterdam Born Children and their Development study-Netherlands (N=4,030), and Generation R study-Netherlands (N=4,877).	France, Australia, the UK, and the Netherlands.	Male and female babies born to immigrant and native parents (France, Australia, UK, Netherlands).	The immigrant health advantage is not universally transferred to children in the form of higher birthweight in all host countries. Higher birthweight among children of immigrants in France (+12 g, P<0.10) and Australia (+40 g, p<0.10) and lower birthweight among children of immigrants in the UK (-82 g, p<0.05) and the Netherlands (-80 g and -73 g, P<0.001) compared with natives' children.
Gibson-Helm et al. (15)	2015	To describe maternal health, pregnancy care, and pregnancy outcomes among migrant women from humanitarian and non-humanitarian source countries.	Retrospective, observational.	Migrant women born in HSCs‡.	Australia: migrants from non-HSCs‡.	HSCs‡ (N=2,713), non-HSCs‡ (N=10,606).	Women from HSCs‡ were more likely to be under 20 (2.9% vs 0.6%, P< 0.001), multiparous (76% vs 51%, P< 0.001), have a BMI†≥25 (50% vs 38%, P<0.001), anaemia (5.9% vs 3.2%, P<0.001), tuberculosis (0.4% vs 0.1%, P=0.001), and syphilis (2.5% vs 0.4%, P<0.001) compared to those from non-HSCs‡. Maternal HSC-birth correlated with poor or no pregnancy care attendance (OR 2.5 [95% CI 1.8-3.6]), late first care visit (OR 1.3 [95% CI 1.1-1.5]), and post-term birth (> 41 weeks) (OR 2.5 [95% CI 1.9-3.4]). Stillbirth (0.8 vs 1.2%, P=0.04, OR 1.5 [95% CI 1.0-2.4]) and unplanned birth before hospital arrival (0.6 vs 1.2%, P< 0.001, OR 1.3 [95% CI 0.8-2.1]) were more frequent in HSC‡-born women.
Gibson-Helm et al. (16)	2014	To describe and compare maternal health, pregnancy care attendance, and pregnancy outcomes.	Retrospective, observational.	Women from HSCs‡.	Women from "non-HSCs‡" North Africa, Middle and East Africa, and West Africa.	1,930 women from HSCs‡; 7,412 from non-HSCs‡.	Migrant women with a refugee background from various African regions are at higher risk of certain adverse pregnancy outcomes than those without a refugee background. 1) Issues such as female genital mutilation (5.1-13.8% vs. 0.3-3.3%), vitamin D insufficiency (23.3-32.0% vs. 8.7-21.5%), syphilis (1.2-7.5% vs. 0-0.3%), and hepatitis B (1.2-18% vs. 0-1.1%) are more common among refugee groups. Additionally, unplanned births before reaching the hospital were notably high in the North African refugee group (3.6%). 2) HSC‡-birth was linked to gestational diabetes mellitus (odds ratio=3.5, 95% confidence interval: 1.8-7.1) among women from Middle and East Africa, after adjusting for maternal age, parity, BMI†, and socioeconomic status. 3) The West African HSC‡ group had the highest stillbirth rate (4.4%).

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Gorman et al. (23)	2014	To explore birth outcomes in Polish migrants to Scotland.	Population-based retrospective.	Polish migrants.	Scottish natives.	119,698 Scottish and 3,105 Polish births.	The relatively lower rate of caesarean sections among Polish mothers compared to Scottish mothers in Scotland can be attributed to the slightly better overall health of Polish mothers.
Henriksson et al. (14)	2020	To assess the prevalence and odds ratios of underweight, obesity, and gestational weight gain (GWG) in the first trimester among migrant (first-generation) and Swedish-born women.	Population-based retrospective.	Migrant (first-generation) and Swedish-born women.	Swedish native.	535,609 pregnancies from the Swedish Pregnancy Register (2010-2018).	Women from North Africa, the Middle East, and Sub-Saharan Africa had higher odds of obesity—1.40 and 2.13 times, respectively—compared to women born in Sweden. Inadequate GWG was prevalent among first-generation migrant women, particularly those from Sub-Saharan Africa.
Juárez et al. (43)	2014	To examine the risk factors and prevalence of adverse pregnancy outcomes among native Portuguese and migrant populations.	Cross-sectional.	Immigrants[¶]	Spaniards	All babies born in Spain (N=1,453,571); studied live births and single deliveries (final N=1,393,095).	Immigrant mothers face higher risks of macrosomia, post-term, and preterm births. Compared to Spaniards, they generally have lower or similar risks for LBW[‖] (OR 0.65-0.87) and preterm babies (OR 0.75-0.93). Most show increased risks for macrosomic (OR 1.21-2.58) and post-term babies (OR 1.11-1.50). Sub-Saharan African mothers have higher risks in all perinatal outcomes.
Kana et al. (44)	2019	To compare risk factors and the prevalence of adverse pregnancy outcomes.	Cross-sectional analysis was conducted using information collected at delivery from the participants of the Generation XXI birth cohort study.	Migrants	Native Portuguese.	A total of 8,495 mothers (91.4% of those invited) and 8,647 children were enrolled; only births with maternal country of birth information (N=8,557) were included.	Migrant mothers had a lower risk of low birthweight and small for gestation, indicating a healthy immigrant effect. Native Portuguese had a significantly higher risk of low birthweight (OR 2.67) and small for gestational age (OR 2.01), but a similar risk for preterm birth (OR 1.38).
Kandasamy et al. (21)	2014	To determine the risk of adverse obstetric and perinatal outcomes.	Retrospective cohort.	Various, refugees.	Canada: non-refugees.	274 refugee women, 273 controls.	Multiparous refugee women had a 36.4% caesarean section rate and a 1.5-fold increase in low birthweight infants compared to non-refugee women. Women from Sub-Saharan Africa also had higher rates of low birthweight infants and caesarean sections. Refugee women had increased rates of prior caesarean sections, HIV[**] SNM[††]-positive status, homelessness, social isolation, and delays in accessing prenatal care.

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Khan et al. (18)	2017	To determine the rates of adverse clinical outcomes, healthcare utilisation, and postpartum Type 2 diabetes in refugees with GDM§, compared to other immigrants and non-immigrants.	Retrospective cohort.	Various refugees.	Canada; other immigrants and non-immigrants.	2,106 refugees, 16,232 other immigrants, 22,564 non-migrants.	Refugees exhibit a similar 'healthy immigrant effect' to other immigrants regarding adverse GDM§ outcomes. Newborns of refugees were less likely to receive well-baby care, and refugee women had a higher risk of developing diabetes postpartum. Both refugees and other immigrants had a lower rate than non-immigrants for many adverse GDM§ outcomes, including pre-eclampsia (relative risk [RR] 0.65, 95% confidence interval [CI] 0.44-0.95 and 0.61, 95% CI 0.52-0.72, respectively), preterm birth (RR‖ 0.87, 95% CI 0.75-0.995 and 0.85, 95% CI 0.80-0.91, respectively), and respiratory distress syndrome (RR‖ 0.83, 95% CI 0.70-0.97 and 0.78, 95% CI 0.72-0.84, respectively).
Kuvacic et al. (47)	1996	To examine the hypothesis that environmental stress may influence the length of gestation, data on deliveries were analysed.	Retrospective cohort.	Bosnia and Herzegovina, Serbia.	Croatia	593 refugees; 7,845 non-displaced women.	In 1990 and 1991, there was a significant difference in displaced persons (P<0.01), but this difference disappeared in 1992. 1) Perinatal mortality was significantly higher in the expatriated population (P<0.01). 2) Expatriated women more often had babies weighing under 2,500 g (P<0.01).
Leppälä et al. (26)	2022	To examine prenatal care with respect to the gestation trimester at the initial prenatal visit, the number of check-ups before birth, and prepartum hospitalisation.	Cross-sectional.	Migrants born in conflict-affected countries.	Country-born parturients in Finland.	Migrants born in conflict-affected countries (n=3155) and country-born parturients (n=93,600).	Migrant parturients had fewer check-ups and started their care later compared to country-born parturients. Among the migrants, 95.3% participated in the recommended minimum number of check-ups, while 96.4% of the Finnish-born group did (P <0.000). The likelihood of migrants having more than ten visits before term birth was lower (aOR=0.58; 95% CI 0.51, 0.66).
Liu et al. (22)	2019	To analyse indicators of perinatal health and health care usage.	Retrospective cohort.	Various, refugees, asylum seekers and undocumented migrants.	Sweden: Swedish-born women.	31,897 migrant women; 1,983 asylum seekers/ undocumented migrants, 29,914 refugees, 254,973 controls.	Migrant women from Syria, Iraq, Somalia, Eritrea, and Afghanistan had higher risks of poor health, gestational diabetes, stillbirth, and low birthweight infants compared to Swedish-born women. Asylum-seekers and undocumented migrants faced greater risks of poor maternal health (RR‖ 1.84, 95% CI 1.72-1.97), preterm birth (RR 1.47, 95% CI 1.21-1.79), inadequateantenatal care (RR ‖ 2.56, 95% CI 2.27-2.89), and missed postpartum visits (RR‖ 1.15, 95% CI 1.10-1.22) than refugee women with residency.
Margioula-Siarkou et al. (45)	2013	To examine the incidence of obstetric and neonatal outcomes between native and immigrant women.	Retrospective cohort.	Immigrants	Natives from Greece.	7,033 singleton pregnancies.	Immigrant women exhibit a reduced risk for severe obstetric and neonatal outcomes, including emergency caesarean sections, pre-eclampsia, preterm delivery, placenta praevia, and fetal distress.

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Merry et al. (38)	2016	1) To describe potential pathways, focusing on modifiable factors, by which migration—using internationally recommended indicators such as country of birth, length of time in the country, fluency in the receiving country's language, migration classification, and ethnicity—may lead to emergency caesarean sections; 2) To propose a framework to guide future research aimed at understanding "potentially preventable" emergency caesarean sections in migrant women.	Narrative review.	Various – refugee/ humanitarian migrants.	Canada; other migrant categories from low- and middle-income countries.	79 humanitarian migrants; 1,769 others.	Migrant status is associated with a higher likelihood of an unplanned caesarean (OR 4.24, CI 1.16–15.46) compared to economic immigrants or temporary residents. Emergency caesareans can occur due to health issues, insufficient support, lack of empowerment, and sub-optimal care.
Michaan et al. (13)	2014	To compare the perinatal outcome of refugees and Israeli parturients.	Retrospective cohort.	Eritrea, Sudan.	Israel; native Israeli women.	247 refugees, 247 controls.	Refugees were younger and leaner, experiencing more premature deliveries under 37 weeks (23 vs. 10, P=0.029) and under 34 weeks (9 vs. 2, P=0.036), with higher neonatal ICU¶ admissions (15 vs. 5, P=0.038). The caesarean section rate was similar, but urgent surgeries were more frequent among refugees (97% vs. 53%, P=0.0001). Refugees also had more cases of meconium and episiotomies, fewer cases of epidural analgesia, 2 intrauterine fetal deaths compared to 13 out of 11,239 deliveries (P=0.036), and 7 pregnancy terminations following sexual assault during escape.
Miller et al. (8)	2016	To examine whether immigrants and mothers from refugee countries have lower adjusted risk of preterm births than US-born mothers in Syracuse, NY.	Retrospective cohort.	Various refugees.	USA	575 presumed refugees; 966 other foreign-born women; 5,388 US-born mothers.	A healthy immigrant effect related to preterm births has been identified. Infants born to both foreign-born women and women from refugee countries demonstrated a reduced risk of being born preterm compared to infants born to US mothers. This finding remains consistent even when controlling for race, late or no prenatal care, maternal age under 18 years, and smoking.

Continuation of Table 2.

Study	Publi-cation year	Study aim	Study design	Country of origin	Recipient country	Participants	Main findings
Paquier et al. (27)	2020	To examine perinatal complications (during pregnancy, labour, delivery and neonatal period).	Monocentric observational.	Recent immigrants of less than 3 years.	Long-term residents in Brussels.	892 pregnant women.	Recent immigrants had less optimal prenatal care, but this did not result in a higher obstetrical and perinatal complication rate.
Waniga-ratne et al. (19)	2018	To examine whether: (1) Refugee mothers face higher risks of adverse maternal and perinatal health outcomes compared to non-refugee mothers from the same country; (2) Refugee and non-refugee immigrants differ from Canadian-born mothers in maternal and perinatal outcomes.	Retrospective cohort.	Sri Lanka, Somalia, Afghanistan, Iraq, and China. Canada, non-refugee immigrant mothers.	Canadian-born mothers.	34,233 refugee immigrant mothers; 243,439 non-refugee immigrant mothers, 615,394 Canadian-born mothers.	Refugees had higher rates of HIV** compared to non-refugee immigrants (0.39% vs 0.20%, AOR 1.82, 95% CI 1.19 to 2.79). Other outcomes, such as caesarean sections (AOR 1.04, 95% CI 1.00 to 1.08) and moderate preterm births (AOR 1.08, 95% CI 0.99 to 1.17), were similar between the two groups. Both refugee and non-refugee immigrants had similar outcomes when compared to Canadian-born mothers.
Waniga-ratne et al. (48)	2016	To assess whether: (1) The healthy migrant effect pertains to infants born to refugee women in relation to SNM††; (2) Refugee status is a risk factor for SNM†† among immigrants; (3) Refugee sponsorship status is a risk factor for SNM†† by comparing asylum-seekers to sponsored refugees; and (4) Refugees face a higher risk of specific SNM†† subtypes.	Retrospective cohort.	Various	Canada: other immigrants, non-immigrants.	29,765 refugees; 230,914 other; Immigrants; 860,617 Non-immigrants; 15,122 Non-sponsored refugees; 10,571 sponsored refugees.	Regarding SNM†† risk, the healthy migrant effect was evident in non-refugee immigrants but less so in refugees, and it may not apply to them. Refugee status was a weak risk factor for SNM†† among immigrants and may not hold clinical significance.

*Studies were included only if they were published in peer-reviewed journals in English, provided data on antenatal care provision and compared perinatal and neonatal outcomes of infants born to refugee mothers who had migrated to high-income countries (according to the World Bank definition) with equivalent outcomes in the native population, or non-refugee migrants resident in the host country; †Body mass index; ‡Humanitarian source countries; §Gestational diabetes; ||Relative risks; ¶Intensive care unit; **Human immunodeficiency virus; ††Severe neonatal morbidity.

Table 3. Overview of the 10 Studies Examining Anaesthetic Care in Migrant Populations Within High-Income Countries*

Study	Publi-cation year	Study aim	Study design	Study country	Population studied	Main findings
Aasheim et al. (28)	2020	To investigate associations between: 1) maternal country of birth, 2) migration-related factors (length of residence, reason for migration, paternal origin), 3) epidural analgesia for labour pain.	Population-based register study.	Norway	Nulliparous women who had given birth from gestational week 22: migrants, non-migrants.	Epidural analgesia was given to 38% of migrant women and 31% of non-migrant women. Compared to non-migrants, the odds were lowest for women from Vietnam (adjOR 0.54; CI 0.50–0.59) and Somalia (adjOR 0.63; CI 0.58–0.68), and highest for women from Iran (adjOR 1.32; CI 1.19–1.46) and India (adjOR 1.19; CI 1.06–1.33). Refugees (adjOR 0.83; CI 0.79–0.87) and newly arrived migrants (adjOR 0.92; CI 0.89–0.94) also had lower odds.
Brebion et al. (29)	2021	To investigate the relationship between maternal immigrant status—defined by both geographic continental origin and the Human Development Index (HDI) of the mother's country of birth—and the utilisation of neuraxial analgesia.	Cross-sectional.	France	6070 women; 959 (15.8%) were immigrants.	Immigrants from countries with very high HDI were more likely to give birth with neuraxial analgesia (adjusted odds ratio [aOR]=2.6; 95% confidence interval (CI), 1.2-5.8; P=0.018) and within 60 minutes after admission (aOR=1.8; 95% CI, 1.2-2.7; P=0.005) compared to native French women. There was no difference in the use of neuraxial analgesia between native French women and immigrant women from different geographic regions or from countries with low HDI.
Hamwi et al. (30)	2023	To examine whether migrant women's proficiency in the host country's language affects their use of neuraxial analgesia and satisfaction with pain management during labour compared to native women.	Secondary analysis of data collected from the Portuguese baMBINO prospective cohort study.	Portugal	1024 native and 1111 migrant women who had singleton vaginal deliveries between 2017 and 2019.	The use of differential obstetric neuraxial analgesia among migrant women in Portugal varies according to their proficiency in the host country's language. This variation does not impact their satisfaction with labour pain management.
Husarova et al. (31)	2016	To identify patterns in intrapartum analgesia use in the migrant obstetric population.	Retrospective, observational analysis.	Ireland	36 689 deliveries with neonates above 500g in weight at a university hospital in Dublin between 2009 and 2013.	African migrants were the least likely to use any pain relief. Migrants from North Africa, Sub-Saharan Africa, the Far East, India, and Eastern Europe had higher odds of not using neuraxial analgesia during delivery compared with Western Europe (all P<0.05). Similarly, those from North Africa, Sub-Saharan Africa, the Far East, North America, Eastern Europe, and India had higher odds of not receiving any analgesia during delivery compared with Western Europe (all P<0.05).
Razum et al. (32)	2017	To evaluate if care quality and responsiveness vary by migration status, using neuraxial anaesthesia (NA) during labour as an indicator.	Cross-sectional.	Germany	6391 women with migration history (first and second generations) and non-immigrant women giving birth in three obstetric hospitals in Berlin, Germany.	In vaginal deliveries, first (but not second) generation women (aOR 0.79, 95% CI 0.65 to 0.95), women with low German language skills (aOR 0.77, 95% CI 0.58 to 0.99) and women with low educational attainment (aOR 0.62, 95% CI 0.47 to 0.82) had lower chances of receiving NA; there was no evidence of overprovision among women with strong affinity to Islam, thus for religious reasons objecting to NA.
Waldum et al. (33)	2020	To assess disparities in the provision of epidural analgesia in planned vaginal birth according to maternal region of birth, compared to native-born counterparts.	Population-based cohort study.	Norway	842,496 live-born singleton deliveries in Norway between 2000 and 2015.	Primiparous women from Latin America/ Caribbean countries with instrumental vaginal delivery were most likely to receive epidural analgesia (OR 2.12, 95%CI 1.69-2.66). In contrast, multiparous women from Sub-Saharan Africa with spontaneous vaginal delivery were least likely to receive epidural analgesia (OR 0.42, 95% CI 0.39-0.44).

Continuation of Table 3.

Study	Publi-cation year	Study aim	Study design	Study country	Population studied	Main findings
Laine et al. (34)	2020	To assess intrapartum epidural use during vaginal delivery among immigrant women giving birth in Norway, compared with Norwegian-born women.	Population-based cohort study.	Norway	602,095 deliveries.	Nulliparous women born in Latin America had higher odds of using intrapartum epidurals (aOR 1.93, CI 1.79-2.09) compared to those born in Norway. Lower odds were observed for women from Sub-Saharan Africa (aOR 0.83, CI 0.78-0.88), East Asia and the Pacific (aOR 0.83, CI 0.80-0.87), and those with unknown birth countries (aOR 0.79, CI 0.71-0.89).
Glance et al. (35)	2007	To examine whether race and ethnicity were associated with the likelihood of receiving epidural analgesia.	Retrospective cohort study.	USA	81,883 women.	Black and Hispanic women in labour are less likely to receive epidural analgesia compared to non-Hispanic White women.
Wilson et al. (36)	2014	To evaluate ethnic/racial differences in labour analgesia characteristics with regard to the timing of request for neuraxial analgesia.	Prospective observational cohort study.	USA	397 parturients, non-Hispanic White, African American, Hispanic, or other.	At the time of neuraxial analgesia placement, Hispanic parturients exhibited a mean cervical dilation difference of 0.8 cm compared to non-Hispanic Whites (95% confidence interval [CI], 0.1-1.4; P=0.047). Ethnicity or race had a minimal impact on the acceptance and request for neuraxial labour analgesia.
Ekéus et al. (37)	2010	To examine the variations in the utilisation of epidural analgesia during labour between native Swedish women and immigrant women.	Population-based register study.	Sweden	455,274 women	Women from Chile (odds ratio (OR) 1.39, 95% confidence interval (CI) 1.23-1.57), Iran (OR 1.38, CI 1.26-1.53), Poland (OR 1.22, CI 1.08-1.37), and Finland (OR 1.10, CI 1.03-1.17) used epidural analgesia more frequently compared to native Swedish women. Conversely, women from Somalia (OR 0.57, CI 0.46-0.70), Iraq (OR 0.71, CI 0.64-0.78), Turkey (OR 0.77, CI 0.69-0.86), and Yugoslavia (OR 0.85, CI 0.79-0.91) used epidural analgesia less often. The use of epidural analgesia increased among immigrant women who had a native Swedish partner.

*Studies were included if they were published in peer-reviewed journals in English, provided data on anaesthetic care provision and compared perinatal and neonatal outcomes of infants born to refugee mothers who had migrated to high-income countries (according to the World Bank definition) with equivalent outcomes in the native population, or non-refugee migrants resident in the host country.

referenced throughout the review. Finally, the fifth and sixth criteria are covered in the Results, with the main findings summarised and interpreted in the Discussion. Although quality assessment for observational studies (cohort, case-control, and cross-sectional studies) is not required for narrative reviews and therefore was not conducted, all included studies were evaluated for methodological biases and limitations.

Scope of the Review

Of the 795 records screened, a total of 41 cohort, case-control, and cross-sectional studies published between 1996 and 2024 met the inclusion criteria and were included in this review (Figure 1). The studies reviewed included data from the following host regions: Europe, Australia, the United States, Canada, Israel, and Norway. The identified immigrant regions of origin included Latin America and the Caribbean, South and East Asia, Africa, and Eastern and Southern Europe.

Among the measured outcomes, ten of forty-one studies focused on the administration of obstetric neuraxial analgesia. The remaining thirty-one studies examined discrepancies in antenatal care and perinatal outcomes between refugees and their native counterparts. Table 2 provides a summary of studies detailing perinatal outcomes, while Table 3 presents a summary of studies focused on anaesthetic care. Whenever reported, we summarised the estimates of association, with

their corresponding 95% confidence intervals and p-values, between residential status (migrants vs. residents) and measured outcomes.

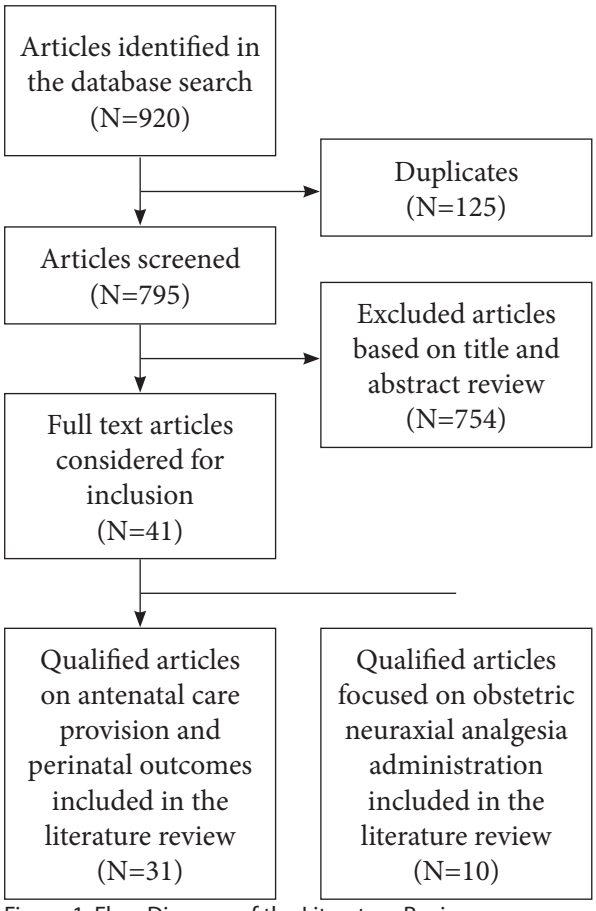

Figure 1. Flow Diagram of the Literature Review.

Synthesis of the Results

The body mass index (BMI) of refugees varied according to their country of origin. Agbemenu et al. (2019) indicated that the pre-pregnancy BMI of U.S.-born White women [mean 26.72, standard deviation (SD) 0.24] was comparable to that of U.S.-born Black women (12) (Table 2). Similarly, Michaan et al. (2014) noted no significant difference in pre-pregnancy BMI but identified a lower BMI at delivery (25.8 vs. 27.2, P=0.036) (13). Conversely, Henriksson et al. (2020) found that women born in North Africa or the Middle East, as well as Sub-Saharan Africa, had increased odds of obesity compared to those born in Sweden, with adjusted odds ratios of 1.40 (95% confidence interval [CI] 1.35-1.44) and 2.13 (95% CI 2.03-2.23), respectively (14). In contrast, inadequate gestational weight gain was frequently observed among first-generation migrant women, particularly those from Sub-Saharan Africa (14).

Most studies indicate that refugees tend to be younger (15, 16) and are more likely to have had multiple pregnancies compared to the native populations of host countries (12, 17, 18) (Table 2). Wanigaratne et al. (2018) demonstrated a 10% higher parity among non-refugee immigrant mothers with more than three previous births, compared to 3.2% for non-refugee immigrant mothers and 2.7% for Canadian-born mothers (19). Additionally, Gibson-Helm et al. (2015) observed that women from humanitarian source countries, as defined by the United Nations classification, exhibited certain characteristics more frequently than women from non-humanitarian source countries. These characteristics included: age below 20 years (0.6% vs 2.9%, P<0.001), multiparity (51% vs 76%, P<0.001), and a body mass index (BMI) of 25 or greater (38% vs 50%, P<0.001) (15).

Maternal Comorbidities

Studies have indicated that refugees are less likely to have high-risk medical conditions (20, 21), such as pre-eclampsia (13, 18) and gestational diabetes (13, 15, 16) (Table 2). However, Kandasamy et al. (2014) (21) found no significant differences in the occurrence of gestational diabetes mellitus or pregnancy-induced hypertension between refugees and the Canadian non-refugee population. Conversely, migrant women from Syria, Iraq, Somalia, Eritrea, and Afghanistan exhibited higher risks of poor self-rated health conditions, including gestational diabetes, compared to women born in Sweden (22). Khan et al. (2017) found that both refugees and other immigrants had a lower incidence of pre-eclampsia compared to non-immigrants, with relative risks (RR) of 0.65

(95% CI, 0.44-0.95) for refugees and 0.61 (95% CI, 0.52-0.72) for other immigrants (18). Gorman et al. (2014) reported that caesarean delivery rates were 19.6% among Polish migrants, compared to 24.5% among native Scottish women (23). The relatively lower rate of caesarean sections among Polish mothers compared to Scottish mothers in Scotland can be attributed to the slightly better overall health of Polish mothers (23). The study also indicated that the latter group was more likely to be overweight and smoke than migrants (23). Polish women in Scotland experienced a higher rate of instrumental deliveries (16.4%) compared to Scottish-born women, who had a rate of 10.1% (23). This difference is attributed to the comparatively better overall health observed among Polish mothers (23). In another study, after adjusting for confounders, the risk of hypertensive disorders of pregnancy was found to be lower for women of migrant origin compared to Finnish women, except for women of Sub-Saharan African origin (24). Conversely, in a separate study by the same authors, women of Kurdish origin had a higher likelihood of developing gestational diabetes (25).

Antenatal Care Utilisation, Along With the Number of Antenatal Care Visits

Five studies included antenatal care visits as an outcome measure (12, 16, 21, 26, 27) (Table 2). Migrant expectant mothers had notably fewer antenatal visits compared to their native counterparts and enrolled in the host country's prenatal care programme at a later stage (12, 13, 21, 26). Similarly, in a monocentric observational study of 892 parturients, Paquier et al. (2020) found that immigrants who had been in Brussels for less than three years received less optimal antenatal care than long-term residents. However, this did not increase obstetric or perinatal adverse outcomes (27). Gibson-Helm et al. (2015) found that African women were more likely to receive their first hospital pregnancy care after 14 weeks of gestation than resettlement country-born women (59.3% compared to 50.9%, P<0.05). Additionally, there was a higher incidence of poor or no attendance at pregnancy care appointments among this group (2.9% compared to 0.7%, P<0.05) (16).

Obstetric Neuraxial Analgesia Use

Refugees and newly arrived migrants had lower odds of receiving epidural analgesia (28-37) (Table 3). Several studies have highlighted the impact of racial disparities on the administration of intrapartum epidural analgesia. According to Glance et al. (2007), Black and Hispanic women in labour are less likely to receive epidural analgesia compared to non-Hispanic White women (35). Aasheim et al. (2020) found that the likelihood of receiving epidural analgesia was lowest among women from Vietnam (adjusted OR 0.54; CI 0.50–0.59) and Somalia (adjusted OR 0.63; CI 0.58–0.68), and highest among women from Iran (adjusted OR 1.32; CI 1.19–1.46) and India (adjusted OR 1.19; CI 1.06–1.33) (28). Husarova et al. (2016) demonstrated higher odds of not using neuraxial analgesia during delivery among migrant parturients from North Africa, Sub-Saharan Africa, the Far East, India, and Eastern Europe (31). Laine et al. (2020) examined intrapartum epidural use during vaginal delivery among immigrant women in Norway. The study found that women born in Latin America had higher odds of using intrapartum epidurals compared to Norwegian-born women (adjusted OR 1.93; CI 1.79-2.09) (34).

In a French population-based study conducted by Brebion et al. (2021), the utilisation of neuraxial analgesia did not significantly differ between native and immigrant populations when immigrant status was categorised by geographic region of origin. However, a significant difference was observed when immigrant status was defined based on the Human Development Index (HDI) of the maternal country of birth (29). Immigrants from countries with a very high HDI were significantly more likely to receive neuraxial analgesia during childbirth compared to native French women (adjusted OR 2.6; 95% CI, 1.2-5.8; P=0.018). However, no association was observed between the timeliness of administering neuraxial analgesia (within 60 minutes of admission) and the mother's country of origin (29).

Obstetric Outcomes

A total of fourteen studies reported on obstetric outcomes (12, 15, 20, 21, 23, 31, 38-45) (Table 2). In a literature review of 76 studies, Merry et al. (2013) demonstrated that parturients from Sub-Saharan Africa, Somalia, and South Asia exhibited higher caesarean rates than native populations, while women from Eastern Europe and Vietnam showed lower trends in caesarean deliveries (38). Higher emergency caesarean delivery rates were observed among populations from North Africa, West Asia, and Latin America (38). Bakken et al. (2015) identified an elevated risk of operative vaginal delivery (adjusted OR 1.28; CI 1.02-1.59) and postpartum haemorrhage (adjusted OR 1.67; CI 1.02-1.59) among women from East, Southeast, and Central Asia compared to Norwegian women (41). Notably, the data indicated that African women had a higher incidence of post-term birth (adjusted OR 1.38; CI=1.06-1.79), meconium-stained amniotic fluid (adjusted OR 1.68; CI=1.40-2.01), episiotomy (adjusted OR 1.56; CI=1.28-1.89), operative vaginal delivery (adjusted OR 1.29; CI=1.02-1.65), emergency caesarean delivery (adjusted OR 1.48; CI=1.14-1.91), postpartum haemorrhage (adjusted OR 1.30; CI=1.03-1.64), low Apgar score (adjusted OR 2.60; CI=1.31-5.18), and low birthweight (adjusted OR 2.15; CI=1.28-3.63) (41). Similarly, Bastola et al. (2020) noted that women of Sub-Saharan African, South Asian, and East Asian origin were at an elevated risk for emergency caesarean delivery (24.1%, 22,3%, 19,4%, respectively) and preterm birth (5.2%, 5.8%, 5.6%, respectively) compared to Finnish women (17%, 4,5%, respectively) (46). Women of Latin American and Caribbean origin exhibited a higher likelihood of undergoing both elective and emergency caesarean deliveries (26.8%) compared to Finnish women (17.0%). In contrast, women of Russian or former USSR origin demonstrated a lower risk of caesarean delivery (14%) (46). Gibson-Helm et al. (2015) reported that migrants were less likely to undergo induced labour (OR 0.8, 95% CI 0.7–0.9), caesarean section (adjusted OR 0.4, 95% CI 0.4–0.5), or assisted vaginal birth (adjusted OR 0.7, 95% CI 0.6–0.9) (16).

Neonatal Outcomes

The reviewed studies seldom reported neonatal outcomes (17, 26, 46-49) (Table 2). Two studies included stillbirths as an outcome measure, both of which indicated an increased risk in the refugee population (20, 48). Specifically, 18.8% (95% CI, 14.2%-23.4%) of stillbirths from mothers of Arab-speaking countries were attributed to congenital anomalies, compared to 12.9% (95% CI, 12.3%-13.5%) of stillbirths among French- or English-speaking women (48). Similarly, Bozorgmehr et al. (2018) found that asylum-seeking women had a higher risk of stillbirths and a greater association with postnatal complications (20). The majority of studies indicate that asylum-seeking parturients have a lower risk of preterm birth compared to natives (10, 13, 15). However, Kandasamy et al. (2014) and Wanigaratne et al. (2018) found no significant difference in preterm deliveries in their analyses (19, 21).

Kana et al. (2019) demonstrated that native Portuguese individuals exhibited a significantly higher adjusted risk of low birthweight (OR 2.67, 95% CI 1.30, 5.48) and small for gestational age (OR 2.01, 95% CI 1.26, 3.21) in comparison to migrants, while the risk for preterm birth remained comparable (OR 1.38, 95% CI 0.81, 2.34) (44). The data from this study indicated that migrant mothers exhibited a lower risk of adverse pregnancy outcomes, even after adjustments were made. This finding suggests the presence of a "healthy immigrant effect". Similarly, Juárez et al. (2014) concluded that the majority of immigrant groups exhibit lower risks of delivering low birthweight infants (odds ratios between 0.65 and 0.87) or preterm infants (between 0.75 and 0.93) compared to Spaniards (43). However, Florian et al. (2023) were unable to demonstrate that the immigrant health effect universally results in higher birthweight for children across all host countries (50). The study measured birthweight-related outcomes among children of immigrants. In France, there was an increase of 12 grams ($P<0.10$), and in Australia, an increase of 40 grams ($P<0.10$) was observed. Conversely, a decrease in birthweight

was noted among children of immigrants in the UK (-82 grams, P<0.05) and the Netherlands (-80 grams and -73 grams, P<0.001) compared with children of native populations (50).

Discussion

Our review of 41 studies found that refugees in high-income countries face a higher risk of adverse perinatal outcomes compared to native populations (13, 19, 21, 27, 39-42). Specifically, despite being identified as low-risk pregnancies, foetuses born to refugee women exhibited a higher likelihood of stillbirth (15, 20, 46, 48, 49), lower Apgar scores (13, 22), and increased morbidity (45, 47-48). Conversely, these pregnancies had a decreased incidence of preterm births (12, 13, 15, 16, 18, 19, 20, 22, 43, 51) and operative deliveries (12, 17, 23, 38, 42, 46, 51).

This review, based on the eligible studies, demonstrated that migrant women are more likely to receive suboptimal antenatal care. Antenatal care encompasses the medical attention provided to a pregnant individual from conception to delivery, including physical examinations, periodic measurements of blood pressure and glucose levels, blood and urine analyses, immunisations, and assessments of foetal growth and heart rate (16). The latest World Health Organization recommendation advises that pregnant women should receive at least eight prenatal check-ups before a full-term birth. These check-ups should occur at 12 weeks of gestation, followed by appointments at 20, 26, 30, 34, 36, 38, and 40 weeks (52, 53). Attending eight or more prenatal visits before a full-term birth demonstrates adherence to the majority of recommended prenatal consultations and screenings, as outlined in the guidelines (53). Despite international initiatives aimed at improving the provision of antenatal care for refugees, evidence indicates that recommended standards are more frequently not adhered to than achieved (12, 21, 26). Cultural differences, such as a preference for female obstetricians, language barriers, and a lack of awareness of host countries' healthcare systems, can pose challenges to migrants, refugees, and asylum seekers in utilising optimal antenatal care. Additionally, women who do not receive prenatal care may not disclose an undiagnosed medical condition from their history and may also miss out on other preventive interventions.

Regarding perinatal mortality, most studies defined this as the intrauterine death of a foetus at or beyond 22 weeks of gestation and/or with a weight of ≥ 500 grams if the gestational age is unknown, as well as the death of a newborn within the first week after birth (17, 26, 46-48). Perinatal morbidity outcomes included stillbirth, low birthweight, preterm birth (≤ 36+6 weeks gestation), growth restriction, congenital abnormalities, a 5-minute Apgar score <7, and neonatal intensive care unit admission (17, 26, 46-48).

Furthermore, the studies included addressed the "healthy immigrant effect" or "healthy immigrant paradox." This term refers to the observation that immigrants often exhibit better health outcomes compared to individuals in their country of origin and the population in their new host nation (7-9). The eligible studies examined the extent of this phenomenon, encompassing reproductive health outcomes (12), preterm deliveries (10), increased birthweight among migrant children (50), and reduced neonatal morbidity (48). According to Florian et al. (2023), the immigrant health effect did not consistently apply to children regarding higher birthweight across all host countries (50). The "healthy immigrant effect" results in higher birthweights among children of immigrants in France and Australia, and lower birthweights among children of immigrants in the United Kingdom and the Netherlands, compared to those of native-born children (50). Juárez et al. (2014) sought to determine whether this hypothesis applies in the Spanish context (43). Their findings indicate that most immigrant groups had either lower or not significantly different risks of delivering low birthweight or preterm infants (43). Similarly, the results of Miller et al.'s (2016) study aligned with previous studies supporting the hypothesis of the healthy immigrant paradox (8).

In relation to neuraxial analgesia usage among migrant parturients, apart from the findings of

Brebion et al. (2021), who observed no preferential treatment favouring immigrant women compared to their native-born counterparts (29), all other studies indicate evidence of differential care in terms of labour analgesia (with lower rates) among immigrant women. This discrepancy is frequently linked to limited language proficiency (28, 30-37).

Strengths and Limitations

Our review possesses several distinctive strengths that differentiate it from numerous other reviews analysing adverse perinatal care outcomes in migrant populations. The data we used, extracted from international maternity registries, were both valid and robust, as evidenced by the consistency of the results. A notable strength of this review is that it is the first to conduct a separate data analysis of obstetric neuraxial use during labour, apart from the perinatal and obstetric outcomes described in other studies.

As with all reviews, our study has certain limitations. The external validity of our findings is limited, as each country has unique healthcare system migration policies and provision patterns that are relevant to most national studies. Although comprehensive online searches were conducted, data from unverified web sources were excluded. Consequently, the findings might be influenced by studies that exclusively include data derived from nations classified as high-income by the World Bank. Additionally, only studies written in English were included, restricting access to information from other reports. Language barriers present a significant challenge to data collection, potentially leading to missing information in medical records. The majority of data in our review were derived from retrospective studies, making it impossible to fully encompass all factors related to adverse perinatal outcomes. Although the maternal country of origin is a crucial factor in evaluating birth outcomes, primary data collection is essential to thoroughly understand the underlying mechanisms of migrant-native disparities. Comprehensive data from larger populations or extended time periods are necessary to examine the healthy immigrant effect and its various aspects.

Future Implications and Research

Strategies for healthcare reform aimed at overcoming barriers to accessing antenatal care could mitigate migrant inequalities that may result in adverse perinatal outcomes. This could also inform relevant health integration policies. In this context, it is crucial to investigate the availability of antenatal programmes tailored explicitly for migrants and ensure they provide higher quality and easier access for this vulnerable group. Additionally, this review emphasises the importance of enhancing data collection on migrant perinatal health registration. This would help identify barriers that limit antenatal care provision globally and support future interventions. Understanding the factors contributing to the healthy immigrant effect may help public health interventionists improve perinatal outcomes through policy adjustments, benefiting both migrants and the native population.

Conclusion

This review analysed the existing literature on antenatal care for refugees, emphasising the adverse obstetric and neonatal outcomes experienced by migrant women in high-income countries. Access to antenatal care, utilisation of labour neuraxial analgesia, and perinatal and neonatal outcomes for migrant women differ from those of their native counterparts in high-income countries. The findings indicate that refugee women encounter various challenges during the perinatal period and suggest that social support interventions could be beneficial. Future investments in healthcare policy strategies are important for reducing inequalities and addressing barriers to antenatal care access in this population.

What Is Already Known on This Topic:

A review of studies on adverse perinatal outcomes among refugees in high-income countries indicates that migrants face a higher risk of adverse outcomes compared to native populations, although they are less likely to experience preterm births or require operative deliveries. Despite international efforts to improve antenatal care for refugees, evidence suggests that the standards recommended by the World Health Organization (WHO) are more frequently not met than achieved.

What This Study Adds:

Evidence from this narrative review indicates that refugees in high-income countries face a higher risk of adverse perinatal outcomes compared to native populations. Migrant women are more likely to receive inadequate antenatal care, which is associated with higher rates of stillbirth and perinatal mortality compared to their native counterparts.

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References

1. Ramadan M, Rukh-E-Qamar H, Yang S, Vang ZM. Fifty years of evidence on perinatal experience among refugee and asylum-seeking women in Organization for Economic Co-operation and Development (OECD) countries: A scoping review. PLoS One. 2023;18(10):e0287617. doi: 10.1371/journal.pone.0287617.
2. Stevenson K, Ogunlana K, Edwards S, Henderson WG, Rayment-Jones H, McGranahan M, et al. Interventions to improve perinatal outcomes among migrant women in high-income countries: a systematic review protocol. BMJ Open. 2023;13(8):e072090. doi: 10.1136/bmjopen-2023-072090.
3. World Bank. Refugee population by country or territory of asylum; 2021. [cited 2025 Mar 27]. Available from: https://data.worldbank.org/ indicator/SM.POP.REFG.
4. World Bank Country and Lending Groups; 2024. [cited 2025 Mar 27]. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and- lending-groups.
5. Verschuuren AEH, Postma IR, Riksen ZM, Nott RL, Feijen-de Jong EI, Stekelenburg J. Pregnancy outcomes in asylum seekers in the North of the Netherlands: a retrospective documentary analysis. BMC Pregnancy Childbirth. 2020;20(1):320. doi: 10.1186/s12884-020-02985-x.
6. Fair F, Raben L, Watson H, Vivilaki V, van den Muijsenbergh M, Soltani H, et al. Migrant women's experiences of pregnancy, childbirth and maternity care in European countries: A systematic review. PLoS One. 2020;15(2):e0228378. doi: 10.1371/journal.pone.0228378.
7. Wingate MS, Alexander GR. The healthy migrant theory: variations in pregnancy outcomes among US-born migrants. Soc Sci Med. 2006;62(2):491-8. doi: 10.1016/j.socscimed.2005.06.015. Epub 2005 Jul 21.
8. Miller LS, Robinson JA, Cibula DA. Healthy Immigrant Effect: Preterm Births Among Immigrants and Refugees in Syracuse, NY. Matern Child Health J. 2016;20(2):484-93. doi: 10.1007/s10995-015-1846-3.
9. Hauck FR. The Healthy Immigrant Effect: Improved Reproductive Health Outcomes Among African Refugee Women Compared with U.S.-Born Women. J Womens Health (Larchmt). 2019;28(6):739-40. doi: 10.1089/jwh.2019.7706. Epub 2019 Mar 21.
10. Saunders SL, Sutcliffe KL, McOrist NS, Levett KM. The associations between women who are immigrants, refugees, or asylum seekers, access to universal healthcare, and the timely uptake of antenatal care: A systematic review. Aust N Z J Obstet Gynaecol. 2023;63(2):134-45. doi: 10.1111/ajo.13632. Epub 2022 Dec 8.
11. The United Nations Refugees and Migrants; 2024. [cited 2025 Mar 27]. Available from: https://refugeesmigrants.un.org/definitions.
12. Agbemenu K, Auerbach S, Murshid NS, Shelton J, Amutah-Onukagha N. Reproductive Health Outcomes in African Refugee Women: A Comparative Study. J Womens Health (Larchmt). 2019;28(6):785-93. doi: 10.1089/jwh.2018.7314. Epub 2019 Feb 15.
13. Michaan N, Gil Y, Amzalag S, Laskov I, Lessing J, Many A. Perinatal outcome and financial impact of Eritrean and Sudanese refugees delivered in a tertiary hospital in Tel Aviv, Israel. Isr Med Assoc J. 2014;16(6):371-4. PMID: 25059000.
14. Henriksson P, Sandborg J, Blomberg M, Nowicka P, Petersson K, Bendtsen M, et al. Body mass index and gestational weight gain in migrant women by birth regions compared with Swedish-born women: A registry linkage study of 0.5 million pregnancies. PLoS One. 2020;15(10):e0241319. doi: 10.1371/journal.pone.0241319.
15. Gibson-Helm ME, Teede HJ, Cheng IH, Block AA, Knight M, East CE, et al. Maternal health and pregnancy outcomes comparing migrant women born in humanitarian and non-humanitarian source countries: a retrospective, observational study. Birth. 2015;42(2):116-24. doi: 10.1111/birt.12159. Epub 2015 Apr 11.
16. Gibson-Helm M, Teede H, Block A, Knight M, East C, Wallace EM, et al. Maternal health and pregnancy outcomes among women of refugee background from African countries: a retrospective, observational study in

Australia. BMC Pregnancy Childbirth. 2014;14:392. doi: 10.1186/s12884-014-0392-0.

17. Biro MA, East C. Poorer detection rates of severe fetal growth restriction in women of likely refugee background: A case for re-focusing pregnancy care. Aust N Z J Obstet Gynaecol. 2017;57(2):186-92. doi: 10.1111/ajo.12593. Epub 2017 Mar 13.
18. Khan S, Yao Z, Shah BR. Gestational diabetes care and outcomes for refugee women: a population-based cohort study. Diabet Med. 2017;34(11):1608-14. doi: 10.1111/dme.13440. Epub 2017 Aug 23.
19. Wanigaratne S, Shakya Y, Gagnon AJ, Cole DC, Rashid M, Blake J, et al. Refugee maternal and perinatal health in Ontario, Canada: a retrospective population-based study. BMJ Open. 2018;8(4):e018979. doi: 10.1136/bmjopen-2017-018979.
20. Bozorgmehr K, Biddle L, Preussler S, Mueller A, Szecsenyi J. Differences in pregnancy outcomes and obstetric care between asylum seeking and resident women: a cross-sectional study in a German federal state, 2010-2016. BMC Pregnancy Childbirth. 2018;18(1):417. doi: 10.1186/s12884-018-2053-1.
21. Kandasamy T, Cherniak R, Shah R, Yudin MH, Spitzer R. Obstetric risks and outcomes of refugee women at a single centre in Toronto. J Obstet Gynaecol Can. 2014;36(4):296-302. doi: 10.1016/S1701-2163(15)30604-6.
22. 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(6):1048-55. doi: 10.1093/eurpub/ckz120.
23. Gorman DR, Katikireddi SV, Morris C, Chalmers JW, Sim J, Szamotulska K, et al. Ethnic variation in maternity care: a comparison of Polish and Scottish women delivering in Scotland 2004-2009. Public Health. 2014;128(3):262-7. doi: 10.1016/j.puhe.2013.11.008. Epub 2014 Mar 7.
24. Bastola K, Koponen P, Skogberg N, Gissler M, Kinnunen TI. Hypertensive disorders of pregnancy among women of migrant origin in Finland: A population-based study. Acta Obstet Gynecol Scand. 2022;101(1):127-34. doi: 10.1111/aogs.14291. Epub 2021 Nov 10.
25. Bastola K, Koponen P, Härkänen T, Luoto R, Gissler M, Kinnunen TI. Pregnancy complications in women of Russian, Somali, and Kurdish origin and women in the general population in Finland. Womens Health (Lond). 2020;16:1745506520910911. doi: 10.1177/1745506520910911.
26. Leppälä S, Lamminpää R, Gissler M, Vehviläinen-Julkunen K. Prenatal care adequacy of migrants born in conflict-affected countries and country-born parturients in Finland. J Migr Health. 2022;6:100122. doi: 10.1016/j.jmh.2022.100122.
27. Paquier L, Barlow P, Paesmans M, Rozenberg S. Do recent immigrants have similar obstetrical care and perinatal complications as long-term residents? A retrospective exploratory cohort study in Brussels. BMJ Open. 2020;10(3):e029683. doi: 10.1136/bmjopen-2019-029683.
28. 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. doi: 10.1016/j.srhc.2020.100553. Epub 2020 Sep 7.
29. Brebion M, Bonnet MP, Sauvegrain P, Saurel-Cubizolles MJ, Blondel B, Deneux-Tharaux C, et al. Use of labour neuraxial analgesia according to maternal immigration status: a national cross-sectional retrospective population-based study in France. Br J Anaesth. 2021;127(6):942-52. doi: 10.1016/j.bja.2021.08.011. Epub 2021 Sep 10.
30. Hamwi S, Barros H, Lorthe E. Migrant-Native Disparities in Obstetric Neuraxial Analgesia Use: The Role of Host-Country Language Proficiency. Anesth Analg. 2023;137(4):870-81. doi: 10.1213/ANE.0000000000006370. Epub 2023 Sep 5.
31. Husarova V, Macdarby L, Dicker P, Malone FD, McCaul CL. The use of pain relief during labor among migrant obstetric populations. Int J Gynaecol Obstet. 2016:;135(2):200-4. doi: 10.1016/j.ijgo.2016.05.003. Epub 2016 Jul 14.
32. Razum O, Reiss K, Breckenkamp J, Kaufner L, Brenne S, Bozorgmehr K, 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. doi: 10.1136/bmjopen-2017-015913.
33. Waldum ÅH, Jacobsen AF, Lukasse M, Staff AC, Falk RS, Vangen S, et al. The provision of epidural analgesia during labor according to maternal birthplace: a Norwegian register study. BMC Pregnancy Childbirth. 2020;20(1):321. doi: 10.1186/s12884-020-03021-8.
34. Laine K, Räisänen S. Effect of maternal country of birth on intrapartum epidural use - A population-based register study of 602 095 deliveries. Eur J Obstet Gynecol Reprod Biol. 2020;250:41-47. doi: 10.1016/j.ejogrb.2020.04.013. Epub 2020 Apr 8.
35. Glance LG, Wissler R, Glantz C, Osler TM, Mukamel DB, Dick AW. Racial differences in the use of epidural analgesia for labor. Anesthesiology. 2007;106(1):19-25; discussion 6-8. doi: 10.1097/00000542-200701000-00008.
36. Wilson SH, Elliott MP, Wolf BJ, Hebbar L. A prospective observational study of ethnic and racial differences in neuraxial labor analgesia request and pain relief. Anesth Analg. 2014;119(1):105-9. doi: 10.1213/ANE.0000000000000260.
37. Ekéus C, Cnattingius S, Hjern A. Epidural analgesia during labor among immigrant women in Sweden. Acta Obstet Gynecol Scand. 2010;89(2):243-9. doi: 10.3109/00016340903508668.
38. Merry L, Semenic S, Gyorkos TW, Fraser W, Small R, Gagnon AJ. International migration as a determinant of

emergency caesarean. Women Birth. 2016;29(5):e89-98. doi: 10.1016/j.wombi.2016.04.001. Epub 2016 Apr 14.

39. Akselsson A, Lindgren H, Georgsson S, Pettersson K, Skokic V, Rådestad I. Pregnancy outcomes among women born in Somalia and Sweden giving birth in the Stockholm area - a population-based study. Glob Health Action. 2020;13(1):1794107. doi: 10.1080/16549716.2020.1794107.
40. 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;15:163. doi: 10.1186/s12884-015-0603-3.
41. 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(2):132-40. doi: 10.1111/birt.12165. Epub 2015 Apr 6.
42. 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. doi: 10.1111/birt.12357. Epub 2018 May 20.
43. Juárez SP, Revuelta-Eugercios BA. Too heavy, too late: investigating perinatal health outcomes in immigrants residing in Spain. A cross-sectional study (2009-2011). J Epidemiol Community Health. 2014;68(9):863-8. doi: 10.1136/jech-2013-202917. Epub 2014 Apr 28.
44. Kana MA, Correia S, Barros H. Adverse Pregnancy Outcomes: A Comparison of Risk Factors and Prevalence in Native and Migrant Mothers of Portuguese Generation XXI Birth Cohort. J Immigr Minor Health. 2019;21(2):307-14. doi: 10.1007/s10903-018-0761-2.
45. Margioula-Siarkou C, Petousis S, Kalogiannidis I, Dagklis T, Traianos V, Goutzioulis M, et al. Immigrants present improved obstetric and neonatal outcomes compared to native women. A northern greek population analysis. J Immigr Minor Health. 2013;15(2):249-54. doi: 10.1007/s10903-012-9727-y.
46. 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(1):12-20. doi: 10.1111/ppe.12611.
47. Kuvacic I, Skrablin S, Hodzic D, Milkovic G. Possible influence of expatriation on perinatal outcome. Acta Obstet Gynecol Scand. 1996;75(4):367-71. doi: 10.3109/00016349609033333.
48. Wanigaratne S, Cole DC, Bassil K, Hyman I, Moineddin R, Shakya Y, et al. Severe Neonatal Morbidity Among Births to Refugee Women. Matern Child Health J. 2016;20(10):2189-98. doi: 10.1007/s10995-016-2047-4.
49. Auger N, Racape J, Raynault MF, Bilodeau-Bertrand M, Lee GE, Janevic T. Stillbirth Among Arab Women in Canada, 1981-2015. Public Health Rep. 2020;135(2):245-52. doi: 10.1177/0033354919900894. Epub 2020 Jan 22.
50. Florian S, Ichou M, Panico L, Pinel-Jacquemin S, Vrijkotte TGM, Harskamp-van Ginkel MW, et al. Differences in birth weight between immigrants' and natives' children in Europe and Australia: a LifeCycle comparative observational cohort study. BMJ Open. 2023;13(3):e060932. doi: 10.1136/bmjopen-2022-060932.
51. Ammoura O, Sehouli J, Kurmeyer C, Richter R, Kutschke N, Henrich W, et al. Perinatal Data of Refugee Women from the Gynaecology Department of Charité University Hospital Berlin Compared with German Federal Analysis. Geburtshilfe Frauenheilkd. 2021;81(11):1238-46. doi: 10.1055/a-1397-6888.
52. Visser GHA, Nicholson WK, Barnea ER, Ramasauskaite D, Nassar AH; FIGO Safe Motherhood, Newborn Health Committee. FIGO position paper on reference charts for fetal growth and size at birth: Which one to use? Int J Gynaecol Obstet. 2021;152(2):148-51. doi: 10.1002/ijgo.13500. Epub 2020 Dec 29.
53. Abalos E, Chamillard M, Diaz V, Tuncalp Ö, Gülmezoglu AM. Antenatal care for healthy pregnant women: a mapping of interventions from existing guidelines to inform the development of new WHO guidance on antenatal care. BJOG. 2016;123(4):519-28. doi: 10.1111/1471-0528.13820. Epub 2015 Dec 23.