



Research Article

Trends and disparities in perinatal health outcomes among women from refugee backgrounds in Victoria, Australia: A population-based study

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ABSTRACT

Background: Women from refugee backgrounds generally experience poorer pregnancy-related outcomes compared to host populations.

Aim: To examine the trend and disparities in adverse perinatal outcomes among women of refugee background using population-based data from 2003 to 2017.

Methods: A population-based cross-sectional study of 754,270 singleton births in Victoria compared mothers of refugee backgrounds with Australian-born mothers. Inferential statistics, including Pearson chi-square and binary logistic regression, were conducted. Multiple logistic regression was conducted to explore the relationship between adverse perinatal outcomes and the women's refugee status.

Findings: Women of refugee background had higher odds of adverse neonatal and maternal outcomes, including stillbirth, neonatal death, low APGAR score, small for gestational age, postpartum haemorrhage, abnormal labour, perineal tear, and maternal admission to intensive care compared to Australian-born women. However, they had lower odds of neonatal admission to intensive care, pre-eclampsia, and maternal postnatal depression. The trend analysis showed limited signs of gaps closing over time in adverse perinatal outcomes.

Discussion and conclusion: Refugee background was associated with unfavourable perinatal outcomes, highlighting the negative influence of refugee status on perinatal health. This evidences the need to address the unique healthcare requirements of this vulnerable population to enhance the well-being of mothers and newborns. Implementing targeted interventions and policies is crucial to meet the healthcare requirements of women of refugee backgrounds. Collaborative efforts between healthcare organisations, government agencies and non-governmental organisations are essential in establishing comprehensive support systems to assist refugee women throughout their perinatal journey.

Statements of significance

Problem or Issue

Women of refugee backgrounds often face more significant

obstacles in accessing healthcare facilities and achieving positive obstetric outcomes when compared to women in host countries.

What is Already Known

Previous research has highlighted disparities in healthcare accessibility and adverse perinatal outcomes based on ethnicity and provided valuable insights into understanding health

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inequalities and the potential impacts on providing healthcare services.

What this Paper Adds

Comprehensive study on refugees under humanitarian visas, covering diverse cultural backgrounds for valuable insights into refugee experiences in Australia.

The inclusion of additional variables like ICU admission provides a thorough understanding of maternal health among refugee women, focusing on contributors to maternal mortality such as perinatal sepsis and postpartum haemorrhage, perinatal depression, and abnormal labour.

Utilization of a multi-faceted approach to defining refugee background status beyond the country of birth, incorporating data from the Settlement Reporting Facility and considering factors like predominant countries of origin and arrival timeframe for nuanced refugee experiences in Victoria.

Introduction

The extent and nature of disparities in perinatal health outcomes vary across countries where refugees settle, dependent on factors like their country of origin and the specific outcomes under investigation. Nevertheless, a consistent pattern indicates poorer pregnancy-related indicators among refugees than women born in the host country (World Health Organization (WHO), 2022). These indicators encompass effects on maternal and infant death, severe maternal complications, postpartum depression, stillbirth, preterm birth, birth defects, and inadequate healthcare quality (World Health Organization, 2018; World Health Organization (WHO), 2022).

Women from refugee backgrounds have a heightened vulnerability to severe maternal morbidity and perinatal complications. A study by Urquia et al. has shown that refugee women living in Australia, Canada and Denmark are at a higher risk of severe maternal morbidity than women born in the host nation (Urquia et al., 2015). Analysis of the Victorian perinatal data collection (VPDC) focusing on perinatal health outcomes of East African immigrant populations in Victoria, Australia, found that these immigrants were more likely to experience perinatal death (stillbirth and neonatal death), give birth to small for gestational age babies, low birth weight babies, and very preterm babies compared to Australian born women (Belihu et al., 2016). Further studies reported a higher incidence of stillbirth among immigrant and refugee populations, particularly those from Africa, Oceania, and South Asia, compared to the general Australian population (Davies-Tuck et al., 2017; Australian Institute of Health Welfare (AIHW), 2019; Rumbold et al., 2020).

Addressing health disparities is crucial, and these necessitate the commitment of health policies and professionals to systematically identify the causes of inequality in healthcare and overcome the obstacles that hinder equitable access (Acharya, 2016). Additionally, it requires the responsible distribution of resources and acknowledging that the key indicators of success lie in morbidity and mortality rates and the overall health and well-being of individuals (Acharya, 2016). When providing healthcare to mothers and newborns, it is important to address certain aspects, including being mindful of the woman's background, ensuring effective communication through interpreting services, providing information about healthcare entitlements and providing woman-centred, culturally sensitive preventive care (World Health Organization, 2018).

Refugee populations are more susceptible to a wide range of physical, mental and social health issues due to their experiences of extreme deprivation and trauma (Knight et al., 2009; Ermansons et al., 2023). The challenges of resettling in a new country and facing persistent disadvantages in host countries where they seek refuge further exacerbate their vulnerability. Previous research has found that women who

escaped conflict zones or experienced sexual violence, including rape and sexual torture, face specific health risks (Richardson et al., 2002; Knight et al., 2009). These risks include higher chances of contracting sexually transmitted diseases, experiencing unwanted pregnancies, facing birth complications and suffering from poor mental health (Hodgson, 2020). It is crucial to address these issues with targeted support and comprehensive healthcare services to improve the well-being of refugee women and promote their successful integration into their new communities (Paxton et al., 2011).

Research on perinatal outcomes based on ethnicity has been valuable for identifying healthcare disparities. Still, it has limitations in understanding specific sub-groups, particularly vulnerable immigrant populations like women from refugee backgrounds. In Victoria, Australia, around 32 % of women giving birth were born overseas, mainly from non-English speaking countries, and approximately 3 % are likely to be of refugee background (Victoria State Government Department of Health (VSGDH), 2022). This highlights the significant presence of immigrant and refugee women in the birthing population, emphasising the need to address their unique healthcare needs and challenges.

This study on adverse perinatal outcome health during singleton birth between 2003 and 2017 significantly contributes to the field by offering distinct insights and advancements. Unlike previous studies focusing on specific immigrant populations (Belihu et al., 2016), this research comprehensively examines refugees under humanitarian visas, encompassing a broader range of cultural backgrounds. By including additional variables such as ICU admission and exploring contributors to maternal mortality like perinatal sepsis and postpartum hemorrhage (Australian Institute of Health and Welfare (AIHW), 2023), the study provides a more comprehensive understanding of maternal health among refugee background women. The deliberate exclusion of Indigenous mothers for precise comparisons, the nuanced approach to defining refugee background status, and the updated information on perinatal health conditions among refugee women further enhance the study's significance.

Therefore, the aim of this study is to examine the perinatal health outcomes of women from refugee backgrounds compared with Australian-born women in Victoria between 2003 and 2017 and to assess trends of adverse perinatal outcomes over time.

Study design, data source and study population

Data were drawn from the population-based observational Victorian Perinatal Data Collection (VPDC), which was established in 1982 under Victoria's public health legislation as a population-based surveillance system that collects detailed data on the health of mothers and infants (Victoria State Government Department of Health (VSGDH), 2022). The VPDC includes thorough processes to ensure data completeness and accuracy. A previous study assessing the validity of the VPDC data found that items reported, such as birthweight (99 % accuracy), estimated gestational age (92 % accuracy), and maternal country of birth (93 % accuracy), demonstrated high levels of accuracy (Davey et al., 2013).

VPDC data used in this study included all singleton births to Australian-born and refugee-background women between 2003 and 2017; women in this data set had previously been categorised as of likely refugee background or not (Gibson-Helm et al., 2014). Indigenous mothers were not included in the analysis of our study due to the well-documented evidence that Indigenous women experience significantly higher rates of adverse perinatal outcomes than non-Indigenous Australian-born women (Davies-Tuck et al., 2017).

Outcome measures

Maternal morbidity: Perineal tears, postpartum haemorrhage, puerperal sepsis, abnormal labour, postnatal depression, and admission to intensive care unit/high dependency unit (ICU/HDU), all as recorded in VPDC. The description of variables included in this study is presented in

Table 1
Operational definition of variables included in the study.

Variable	Operational definition	Category
Adverse maternal outcome		
3rd/4th-degree perineal tear	Perineal laceration, rupture or tear occurring during delivery, also involving anal sphincter, rectovaginal septum, anal mucosa and/or rectal mucosa	No Yes
Postpartum haemorrhage	Blood loss >500 ml following vaginal birth	No Yes
Puerperal sepsis	Infection of the genital tract occurring anytime between the rupture of membranes or labour and the 42nd day.	No Yes
Abnormal labour	Abnormalities of forces of labour (inadequate contractions, uterine inertia)	No Yes
Postnatal depression	The degree of the woman's possible symptoms as represented by an Edinburgh Postnatal Depression Scale (EPDS) score (1)	No Yes
Admission to ICU/HDU	Admission status of mothers to intensive care unit (ICU) or high dependency unit (HDU), admitted as public or private patients during the index childbirth.	No Yes
Adverse neonatal outcomes		
Preterm birth	Birth before 37 completed weeks of gestation (Gestational age was estimated from the first date of the last 'normal' menstrual period and/or early obstetric ultrasound, usually before 12 weeks of gestation.)	No Yes
Admission to NICU/SCN	Admission to a neonatal intensive care unit (NICU) or special care nursery (SCN)	No Yes
Small for gestational age	Birthweight below the 10th percentile for gestational age based on the Australian national birthweight chart. (Gestational age was estimated from the first date of the last 'normal' menstrual period and/or early obstetric ultrasound, usually before 12 weeks of gestation.)	No Yes
APGAR score	For live-born infants at 37 or more weeks gestation, APGAR score <7 at 5 min	No Yes
Stillbirth	Deaths before the complete expulsion or extraction of a product of conception at 20 or more weeks of gestation or 400 g or more if gestational age is unknown.	No Yes
Neonatal death.	Deaths within 28 days of birth among the live-born	No Yes
Confounding variables		
Parity	The total number of previous pregnancies experienced by the woman that have resulted in a live birth or a stillbirth	Primiparous Multiparous
Gravidity	The total number of pregnancies, including the current one	Primigravida Multigravida
Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD)	Area-based socio-economic status measure from Australian Bureau of Statistics, where a low score illustrates greater disadvantage. Uses aggregated statistical local area household characteristics	1st Quintile (most disadvantaged) 2nd Quintile 3rd Quintile 4th Quintile 5th Quintile (least disadvantaged)

Table 1 (continued)

Variable	Operational definition	Category
	to measure relative area-specific advantages and disadvantages. Category ranges from "1" Most disadvantaged area to "5" least disadvantaged area (2)	
Body Mass Index (BMI)	A ratio of mother's height and weight, categorised as: BMI < 18.5 kg/m ² (underweight), BMI 18.5–29.9 kg/m ² (normal weight), BMI 30–34.9 kg/m ² (overweight or obese)	Normal Underweight Overweight/obese
Smoking status	A self-reported indicator of whether a pregnant woman smoked tobacco at any time during her pregnancy.	No Yes
Antepartum haemorrhage (APH)	Bleeding from the genital tract after the 20th week of pregnancy and before the onset of labour.	No Yes
Maternal medical condition	Presence of any pre-existing medical condition that affected the index pregnancy or its management (e.g., pre-existing essential hypertension, diabetes mellitus).	No Yes

The definitions for the variables are sourced from the Victorian Perinatal Data Collection (VPDC) (3).

Table 1.

Neonatal morbidity and mortality: Preterm birth, admission to neonatal intensive care unit/ special care baby unit (NICU or SCBU), small for gestational age, APGAR score (below 7 at 5 min), stillbirth, and neonatal death (Table 1).

Exposure variable

Women of refugee background

Women of refugee background were defined as those from countries where at least two-thirds of migration from that country to Victoria yearly over the last ten years through the humanitarian migration program (Gibson-Helm et al., 2014). Supplementary file (File.1) contains the lists of countries considered refugee backgrounds.

Statistical analysis

Stata version 17 was used to conduct the data analysis (StataCorp, 2021). In the descriptive analysis, frequencies and percentages of adverse perinatal health outcomes and perinatal mortality based on refugee background status were examined. To test for differences in adverse neonatal and maternal outcomes between mothers of refugee background and Australian-born mothers, we employed Pearson's chi-square test. For each outcome studied, both crude and adjusted odds ratios, along with their corresponding 95 % confidence intervals, were calculated to assess the association between maternal refugee background status and adverse maternal and neonatal outcomes.

Adjusted logistic regression models with 95 % confidence intervals were performed for each outcome, adjusting for year of index birth, maternal age, parity, gravidity, socio-economic status (measured by Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) (Walker and Hiller 2005) body mass index (BMI), smoking status, past medical conditions and APH. These confounders were chosen based on previous literature suggesting their potential associations with both birth outcomes and refugee status (Belihu et al., 2016; Puthussery, 2016; Ammoura et al., 2021). Year of index birth was incorporated as a covariate to account for any temporal changes in adverse outcomes (Belihu

et al., 2016). All comparisons were made in reference to non-indigenous Australian-born mothers.

Findings

Maternal characteristics

The study population comprised 754,270 singleton births to mothers born in Australia (721,425) and refugee backgrounds (32,845) between 2003 and 2017 (see Fig. 1). The characteristics of women included in the study are displayed in Table 2. Among the singleton pregnancies examined, 4.5 % were from refugee backgrounds. Women from refugee backgrounds were slightly younger (mean age 29.5 vs. 30.9, $P < 0.001$), although in both groups, most women were aged 25–34 years. Women from refugee backgrounds were more likely to have had previous pregnancies (71.9 % vs. 56.9 %, $P < 0.001$) and be from socioeconomically disadvantaged areas. Women from refugee backgrounds had lower smoking rates (1.4 % vs. 7.9 %, $P < 0.001$) but similar rates of healthy weight (47.7 % vs. 47.8 %, $P < 0.001$). Women from refugee backgrounds had a lower rate of gestational hypertension (2.0 % vs. 3.5 %, $P < 0.001$) but a higher incidence of gestational diabetes (10.2 % vs. 5.1 %, $P < 0.001$).

Adverse perinatal health outcomes

Table 3 displays the adverse perinatal outcomes. There is a statistically significant difference in perinatal outcomes between Australian-

born women and women from refugee backgrounds. Compared to Australian-born women, women of refugee background tend to experience a higher incidence in most of the assessed adverse perinatal outcomes. However, preterm birth, postnatal depression, pre-eclampsia, and baby admission to NICU/SCN are higher among Australian-born mothers compared to women from refugee backgrounds.

Maternal refugee status and adverse perinatal health outcomes

Table 4 presents the results of both unadjusted and adjusted binary logistic regression analyses. Accounting for potential confounding factors, compared to women born in Australia, women of refugee background demonstrated significantly higher odds of outcomes, specifically: APGAR score at five minutes (adjusted odds ratio 1.18 (95 %CI: 1.05, 1.33); $p < 0.001$), small for gestational age (1.75 (1.66, 1.83); $p < 0.001$), stillbirth (1.47 (1.17, 1.82); $p < 0.001$), neonatal death (1.83 (1.31, 2.57); $p < 0.001$), 3rd/4th-degree perineal tear (1.55(1.4, 1.72); $p < 0.001$), postpartum haemorrhage (1.13 (1.08, 1.17); $p < 0.001$), abnormal labour (1.65 (1.68, 1.71); $p < 0.001$), puerperal sepsis (2.23 (1.67, 2.98); $p < 0.001$), and maternal admission to the ICU/HDU (1.45 (1.35, 1.62); $p < 0.001$). However, they had lower odds of baby admission to the NICU/SCN (0.90 (0.85, 0.94); $p < 0.001$), pre-eclampsia (0.83 (0.74, 0.94); $p < 0.001$) and maternal postnatal depression (0.23 (0.12, 0.46); $p < 0.001$). The apparent advantage of women from refugee backgrounds in lower preterm birth disappeared in adjusted analyses (Table 4).

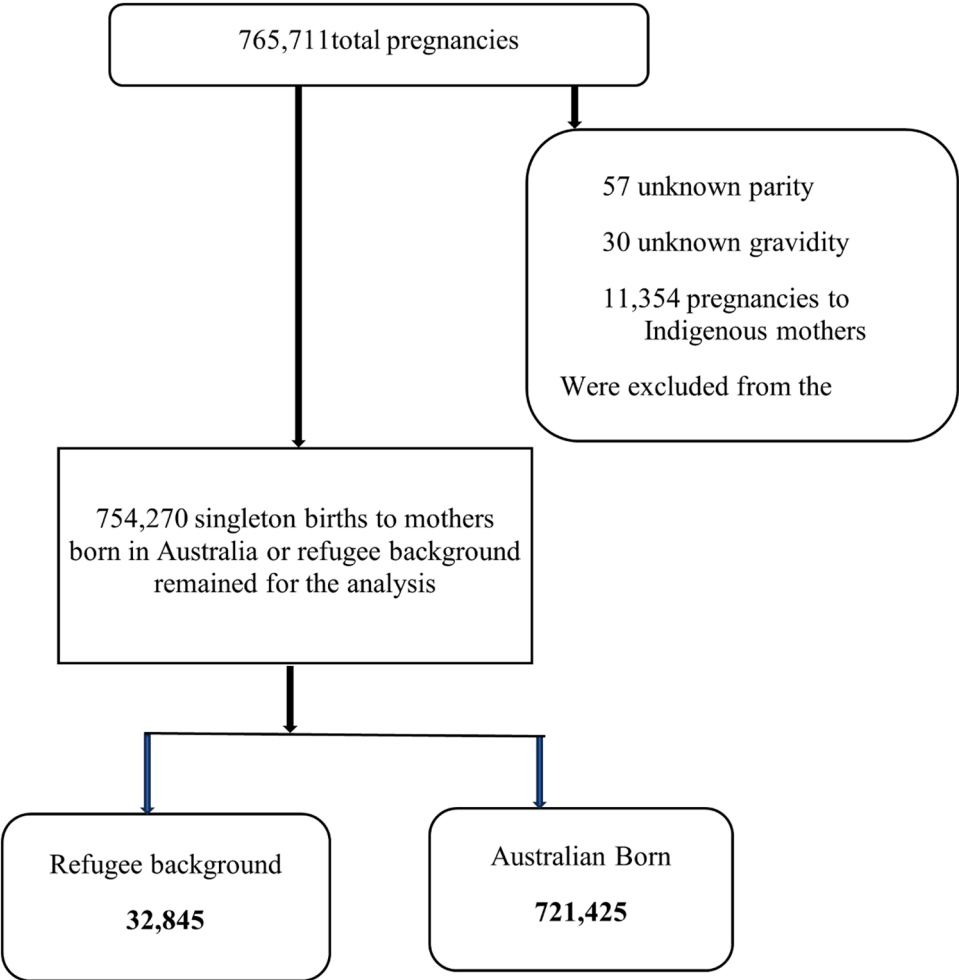


Fig. 1. Schematic description of the study populations included.

Table 2

Characteristics of Australian-born and refugee background women who gave birth between 2003 and 2017 in Victoria, Australia.

Variables*	Australian born N (%)	Refugee-background N (%)
N (%)	721,425 (95.6)	32,845 (4.4)
Age in years		
<20	17,402 (2.4)	714 (2.2)
20–24	78,791 (10.9)	6144 (18.7)
25–34	436,393 (60.5)	19,143 (58.3)
>35	188,611 (26.2)	6842 (20.8)
Parity		
Primipara	311,308 (43.2)	9265 (28.2)
Multipara	410,117 (56.8)	23,580 (71.8)
Gravidity		
Primigravida	231,509 (32.1)	7525 (22.9)
Multigravida	489,916 (67.9)	25,320 (77.1)
IRSAD scores		
1 Quintile (most disadvantaged)	89,657 (12.4)	13,153 (40.2)
2nd Quintile	120,863 (16.8)	6165 (18.8)
3rd Quintile	149,265 (20.8)	6701 (20.5)
4th Quintile	171,407 (23.8)	4273 (13.0)
5th Quintile (least disadvantaged)	189,693 (26.3)	2466 (7.5)
Body Mass Index		
Normal weight	191,968 (47.8)	9268 (47.7)
Underweight	9449 (2.6)	676 (3.5)
Overweight/Obese	200,285 (49.9)	9486 (48.8)
Year of index birth		
2003–2007	239,963 (33.4)	8683 (26.4)
2008–2012	244,199 (33.8)	11,928 (36.3)
2013–2017	237,263 (32.9)	12,234 (37.3)
Smoking before gestational age of 20 weeks		
Yes	55,771 (13.1)	430 (2)
No	368,229 (86.9)	21,439 (98.0)
Smoking after gestational age of 20 weeks		
Yes	29,148 (8.2)	190 (1.0)
No	325,564 (91.8)	19,323 (99.0)
Smoking at any time during pregnancy		
Yes	56,914 (7.9)	450 (1.4)
No	664,511 (92.1)	32,395 (98.6)
Pre-existing hypertension		
Yes	9575 (1.3)	249 (0.8)
No	711,850 (98.7)	32,596 (99.2)
Gestational hypertension		
Yes	24,911 (3.5)	666 (2.0)
No	696,514 (96.6)	32,179 (98.0)
Pre-existing diabetes		
Yes	4663 (0.7)	81 (0.9)
No	716,762 (99.3)	32,564 (99.1)
Gestational diabetes		
Yes	36,844 (5.1)	3340 (10.2)
No	684,581 (94.9)	29,505 (89.8)

*all categories showed statistically significant differences ($P < 0.001$).

Trends of adverse perinatal outcomes

Trend analyses indicate a generally consistent pattern in outcomes between Australian-born women and women from refugee backgrounds over time (Fig. 2a). While outcomes for mothers from refugee backgrounds fluctuate, those for Australian-born mothers exhibit more stable patterns, contributing to a smoother trend line for the Australian-born group. This is partly due to the smaller sample size for each outcome assessed among women of refugee background compared to Australian-born mothers, resulting in a smoother trend line for the latter. Any narrowing of the gap between groups over time appears inconsistent, and inequalities in some maternal outcomes seem to be growing over time (Fig. 2a and 2b).

Discussion

The objective of this study was to examine the adverse perinatal health outcomes for women from refugee backgrounds in Victoria from 2003 to 2017, in comparison to those for Australian-born women, and to

Table 3

Selected perinatal health outcomes of Australian-born and refugee background women giving birth in Victoria, Australia, between 2003 and 2017.

Perinatal outcomes	Maternal refugee status		P-values
Adverse neonatal outcomes			
Preterm birth	Australian-born (N = 721,425) 45,666 (6.3)	Refugee background (N = 32,845) 1803 (5.6)	<0.001
5 min APGAR Score <7	Australian-born (N = 674,870) 9032 (1.3)	Refugee background (N = 30,967) 496 (1.6)	<0.001
Stillbirth	Australian-born (N = 720,162) 3149 (0.4)	Refugee background (N = 32,757) 228 (0.7)	<0.001
Neonatal death	Australian-born (N = 718,276) 1263 (0.2)	Refugee background (N = 32,617) 88 (0.3)	<0.001
Small for gestational age	Australian-born (N = 721,074) 57,693 (8.0)	Refugee background (N = 32,822) 3394 (10.3)	<0.001
Baby admission to NICU/SCN	Australian-born (N = 706,345) 104,140 (14.7)	Refugee background (N = 32,671) 4161 (12.7)	<0.001
Adverse maternal outcomes			
Perinatal depression	Australian-born (N = 721,425) 1739 (0.2)	Refugee background (N = 32,845) 20 (0.06)	<0.001
3rd/4th-degree perineal tear	Australian-born (N = 715,864) 10,104 (1.4)	Refugee background (N = 32,819) 600 (1.8)	<0.001
Postpartum haemorrhage	Australian-born (N = 425,356) 90,807 (21.3)	Refugee background (N = 21,881) 4880 (22.3)	0.001
Abnormal labour	Australian-born (N = 721,425) 104,842 (14.5)	Refugee background (N = 32,845) 6984 (21.3)	<0.001
Puerperal sepsis	Australian-born (N = 721,425) 523 (0.07)	Refugee background (N = 32,845) 55 (0.17)	<0.001
Maternal admission to ICU/HDU	Australian-born (N = 717,889) 7509 (1.04)	Refugee background (N = 32,804) 459 (1.4)	<0.001
Pre-eclampsia	Australian-born (N = 721,425) 19,152 (2.65)	Refugee background (N = 32,845) 664 (2.02)	<0.001

assess trends of these adverse outcomes over time. This analysis found a significant association between a range of adverse perinatal outcomes and women of refugee background, except for neonatal NICU/SCN admissions, postnatal depression, and pre-eclampsia, which were more commonly observed in Australian-born women.

Our findings of adverse perinatal outcomes among women from refugee backgrounds are consistent with previous research (Kandasamy et al., 2014; Vik et al., 2019; Sturrock et al., 2020; Ammoura et al., 2021; Harakow et al., 2021; Väisänen et al., 2022). Numerous studies have noted the existence of a phenomenon known as the 'healthy migrant effect', which suggests that migrants tend to exhibit better health than both the population they left in their home country and the majority in the host country, particularly within ten years after arriving (McDonald and Kennedy 2004; Blair and Schneeberg 2014; Juárez and

Table 4

Crude and adjusted odds ratios with (95 %CI) for selected perinatal health outcomes of refugee background women and Australian-born women giving birth to singletons in Victoria, Australia, between 2003 and 2017.

Adverse perinatal outcomes	Australian-born (as reference)	Refugee background Odds ratio (95 %CI)
Preterm birth		
OR (95 % CI)	1.00	0.85 (0.82,0.90)
AOR (95 % CI)	1.00	0.99 (0.92, 1.06)
APGAR Score at five minutes		
OR (95 % CI)	1.00	1.19 (1.09, 1.31)
AOR (95 % CI)	1.00	1.18 (1.05, 1.33)
Small for Gestational Age		
OR (95 % CI)	1.00	1.32 (1.27, 1.37)
AOR (95 % CI)	1.00	1.75 (1.66, 1.83)
Stillbirth		
OR (95 % CI)	1.00	1.65 (1.39, 1.82)
AOR (95 % CI)	1.00	1.47 (1.17, 1.82)
Neonatal death		
OR (95 % CI)	1.00	1.53 (1.23, 1.90)
AOR (95 % CI)	1.00	1.83 (1.31, 2.57)
Baby admission to NICU/SCN		
OR (95 % CI)	1.00	0.86 (0.83, 0.90)
AOR (95 % CI)	1.00	0.90 (0.85, 0.94)
Perinatal depression		
OR (95 % CI)	1.00	0.25 (0.16, 0.39)
AOR (95 % CI)	1.00	0.23 (0.12, 0.46)
3rd/4th-degree perineal tear		
OR (95 % CI)	1.00	1.31 (1.20, 1.41)
AOR (95 % CI)	1.00	1.55 (1.40, 1.72)
Postpartum haemorrhage		
OR (95 % CI)	1.00	1.05 (1.02, 1.09)
AOR (95 % CI)	1.00	1.13 (1.08, 1.17)
Abnormal labour		
OR (95 % CI)	1.00	1.58 (1.54, 1.63)
AOR (95 % CI)	1.00	1.65 (1.68, 1.71)
Puerperal sepsis		
OR (95 % CI)	1.00	2.31 (1.75, 3.05)
AOR (95 % CI)	1.00	2.23 (1.67, 2.98)
Maternal admission to ICU/ HDU		
OR (95 % CI)	1.00	1.34 (1.22, 1.48)
AOR (95 % CI)	1.00	1.45 (1.35, 1.62)
Pre-eclampsia		
OR (95 % CI)	1.00	0.75 (0.67,0.82)
AOR (95 % CI)	1.00	0.83 (0.74,0.92)

OR: Odds Ratio; AOR: Adjusted Odds Ratio; CI: confidence interval; ICU: Intensive Care Unit; HDU: High Dependency Care; NICU/SCN: Neonatal Intensive Care Units/Special Care Nurseries.

Reuelta-Eugercios 2016; Helgesson et al., 2019). However, it is essential to acknowledge that this effect may not apply to refugees. Unlike other migrants who may choose to move voluntarily, refugees are compelled to leave their home country due to persecution, war, or violence. Their migration experiences are often characterised by hardship and may involve prolonged stays in one or more transitional countries as they seek safety and refuge. This forced and often arduous journey can significantly impact the health and well-being of refugees, setting them apart from other migrant populations and highlighting the unique challenges they face (Wanigaratne et al., 2016; World Health Organization (WHO), 2022). Most of the findings from our analysis support the association between adverse perinatal health outcomes and being of a refugee background. This study used a dataset that explicitly excluded migrants from non-refugee backgrounds, enabling us to present significant insights into health disparities and their implications for healthcare provision among the most vulnerable immigrant groups, specifically women with refugee backgrounds.

Our study showed disparities in perinatal outcomes, with measures including stillbirth, neonatal death, small for gestational age and five-minute APGAR score among women of refugee background all worse compared to Australian-born mothers. These findings for births in the period up to 2017 align with those previously reported in Australia and other high-income countries such as Sweden (Essén et al., 2002),

Germany (Ammoura et al., 2021), Canada (Wanigaratne et al., 2016), Norway (Vik et al., 2019), England (Gardosi et al., 2013), the Netherlands (Ravelli et al., 2011), and Belgium (Racape et al., 2010). Likewise, systematic reviews of adverse perinatal outcomes among women of refugee background in high-income countries have consistently shown that these women are more susceptible to experiencing adverse perinatal outcomes, including stillbirth, neonatal mortality, small for gestational age, and five-minute APGAR less than seven than the host population (Heslehurst et al., 2018; Harakow et al., 2021; Behboudi-Gandevani et al., 2022b).

However, neonatal intensive care admissions were less frequent among women from refugee backgrounds when compared to Australian-born mothers in our study and there were no significant differences (in adjusted analysis) in preterm birth. Previous research has shown a strong correlation between adverse neonatal outcomes and smoking, with a notable increase in neonatal intensive care unit admissions among the smoking cohort (Li et al., 2019). Lower smoking rates in women of refugee background may contribute to lower neonatal admissions; however, in this study, we have controlled for smoking and the result persisted after adjusted analysis.

Our study also demonstrated poorer maternal outcomes for refugee-background women compared to Australian-born women across maternal morbidity outcomes, including postpartum haemorrhage, perineal tear, abnormal labour, puerperal sepsis and maternal admission to the ICU/HDU. A systematic review conducted in high-income settings reported refugee women exhibited a higher frequency of shoulder dystocia (Behboudi-Gandevani et al., 2022a). Further studies reported higher odds of admission to the ICU among women from refugee backgrounds compared to women born in host countries (Van Hanegem, Miltenburg et al. 2011; Gieles et al., 2019). In contrast, rates of postnatal depression and pre-eclampsia were lower in refugee-background women compared to their Australian-born peers. This finding aligns with previous systematic reviews (Harakow et al., 2021; Yeo et al., 2023) and studies conducted in high-income countries (Naimy et al., 2015; Bastola et al., 2022). Others have raised the importance of disentangling prevalence from under-servicing, for example, language barriers. Consequently, the true prevalence of pre-eclampsia among refugee women may be underestimated (Col Madendag, Eraslan Sahin et al. 2019; Clarfield et al., 2023).

This study identified a lower incidence of postnatal depression among women from refugee backgrounds compared to Australian-born mothers contrasts with existing literature, which predominantly demonstrates a higher incidence of perinatal depression among women from refugee backgrounds and links adverse perinatal outcomes to postnatal depression (Heslehurst et al., 2018; Ammoura et al., 2021; Clarfield et al., 2023). The lower incidence of postnatal depression in women from refugee backgrounds compared to Australian-born women in this study could also be due to reporting bias or a genuine result.

The first potential source of reporting bias is the tool used to measure the variable. The Edinburgh Postnatal Depression Scale (EPDS) is advised for use in pregnancy for a possible depressive disorder according to the Australian Pregnancy Guidelines (Department of Health, 2020). A cutoff point of 13 or more on the EPDS has been set to detect possible depression in pregnant women with moderate sensitivity and high specificity. However, applying this specific cutoff to women of refugee background in our study might have led to a reduced likelihood of identifying cases of postnatal depression (Ravelli et al., 2011; Gardosi et al., 2013). Previous research has highlighted the difficulties in using the EPDS for women from refugee backgrounds. According to Ogbo et al., conventional mental health services inadequately capture the unique circumstances of women of refugee background, leading to the potential masking of specific perinatal depression patterns (Ogbo et al., 2019). This could result in the development of interventions by policymakers and practitioners that might not effectively address the individual needs of these women (Ogbo et al., 2019). Translation and language barriers can pose challenges, as certain words and concepts

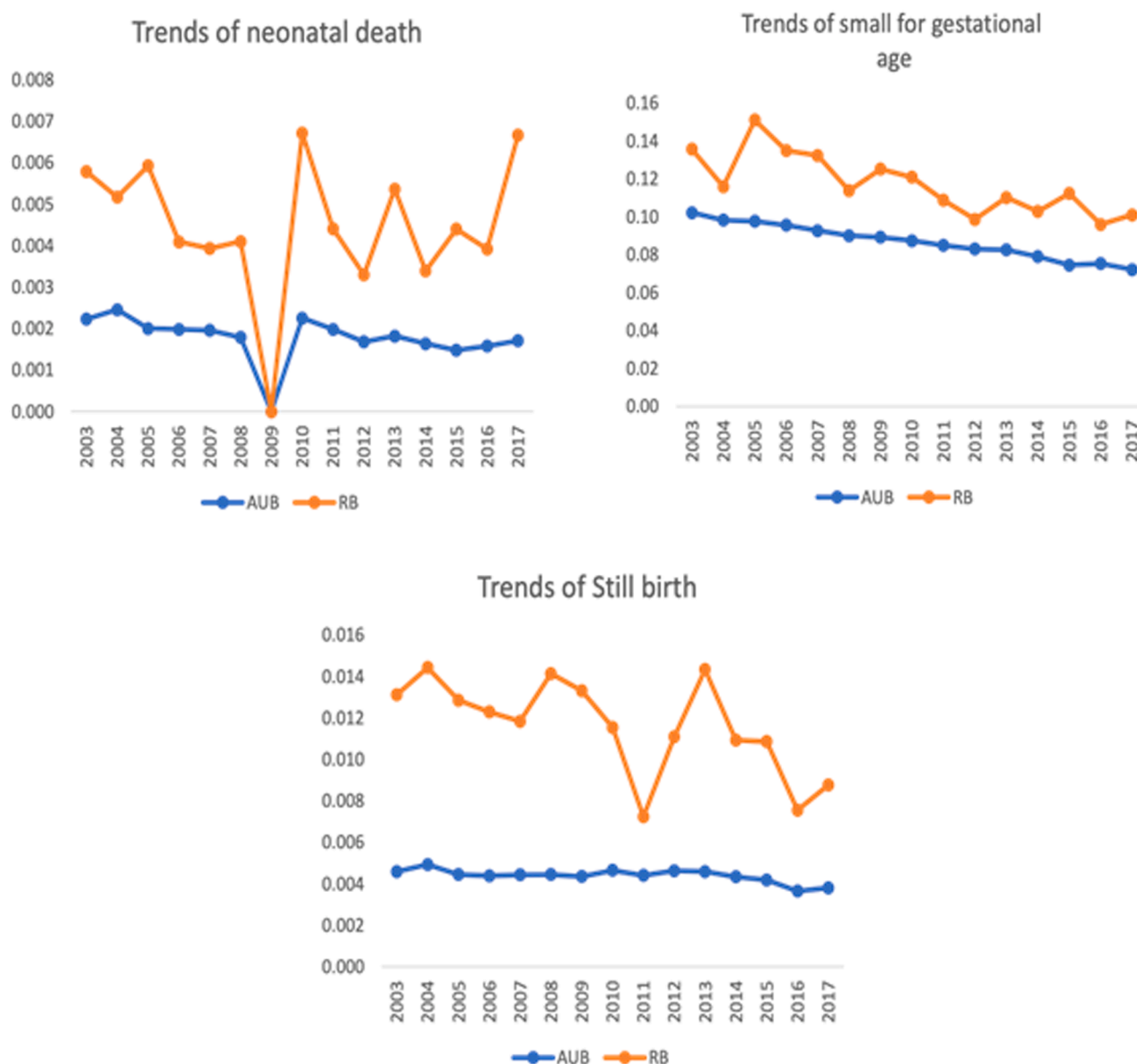


Fig. 2(a). Trends of neonatal death, small for gestational age, and stillbirth from 2003 to 2017 between refugee background women (RB) and Australian-born mothers (AUB).

PPH: Postpartum hemorrhage AUB: Australian born mothers RB: refugee background.

may not have direct equivalents in the language preferred by women. Additionally, women were asked to fill out the EPDS themselves, which can become complex if they are illiterate. This complexity may further arise when using interpreters or relying on their husbands for assistance (Small et al., 2007).

A second potential source of reporting bias is stigma. Mental health issues among women of refugee background are often accompanied by a pervasive social stigma, which creates significant barriers when seeking help or support. This stigma is particularly pronounced when addressing mental health issues and seeking assistance (DeSa et al., 2022). Working with bicultural workers and multilingual peer navigators from the refugee community can help diminish the stigma attached to mental health issues (Department of Health, 2020; DeSa et al., 2022).

The trend analysis in our study shows that the disadvantage for women from refugee backgrounds is not reducing over time. A review of evidence across the WHO European Region determined that there was a marked trend of worse outcomes for migrant women compared to women born in the host country (World Health Organization, 2018).

Likewise, a longitudinal study over 30 years in Canada revealed an increasing trend of stillbirths among women of refugee background compared to those born in Canada (Auger et al., 2020). Trend analysis offers valuable insights to healthcare professionals, policymakers and stakeholders, aiding in the comprehension of unmet care needs and the scale of health issues (Chao et al., 2016).

Strengths and limitations

Strengths of this study include a comprehensive range of vulnerable and disadvantaged women in the analysis, the inclusion of outcomes for both mothers and newborns, the use of a reliable and accurate dataset and a large population-based sample.

The study has some limitations to consider. The availability of adequate maternal health services, particularly the provision of optimal antenatal care, has been shown to enhance the overall perinatal well-being of women and their infants (Sturrock et al., 2020; Yelland et al., 2020). However, in our research, we were unable to investigate women

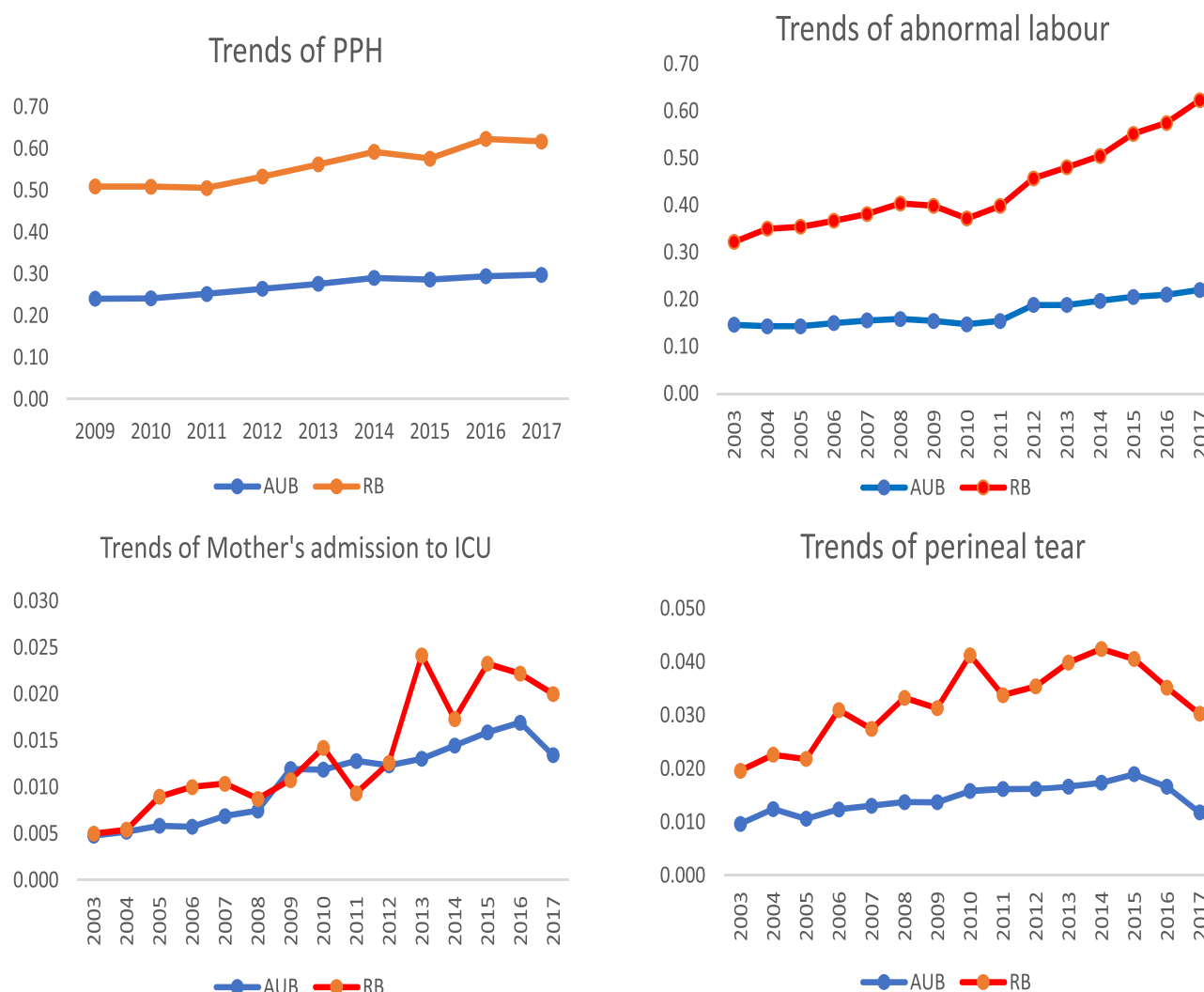


Fig. 2(b). Trends of postpartum haemorrhage, abnormal labour, admission of mothers to ICU, 3rd/4th-degree perineal tear from 2003 to 2017 between refugee background women (RB) and Australian-born mothers (AUB).

of refugee background's access to these maternal health services due to the lack of relevant variables in the data for analysis, such as model of maternity care and access to interpreter services. This study did not assess certain sociodemographic variables that have been reported to impact the outcomes investigated, such as educational status, marital status, or the year of arrival in Australia. Academic status, for example, can influence a woman's access to information and resources related to maternal health (Nguyen et al., 2023), while marital status may influence the level of social support available to her (Doma et al., 2022). Additionally, the duration of stay in Australia can affect a woman's familiarity with the healthcare system and her ability to navigate it effectively (Belihu et al., 2016). Due to the unavailability of these data, we could not examine the potential influence of these sociodemographic factors on the outcomes of interest in our study. Finally, the relatively small sample size of the women from refugee background group in each year of the data generated substantial year-to-year variation in trend analyses that may have obscured changes in health outcome disparities over time.

Conclusion

The study highlights a significant association between being a woman from refugee backgrounds and adverse perinatal outcomes. In contrast, we found that neonatal NICU/SCN admissions, pre-eclampsia

and postnatal depression were better in women of refugee background than in Australian-born women. The "healthy migrant effect" observed in other migrant populations may not apply to refugees due to their forced and challenging migration experiences. Trend analysis over fifteen years showed limited signs of gaps closing over time in adverse perinatal outcomes, emphasising the importance of doing more to understand and address the unmet care needs of refugee women and allocating resources accordingly.

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Disclaimer

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Ethical statement

Ethical approval was gained from the Royal Children's Hospital (RCH), HREC Reference Number: 36305. The Deakin University Human Research Ethics Committee (DUHREC) provided reciprocal ethics

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NA.

CRediT authorship contribution statement

Yordanos Gizachew Yeshitila: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Lisa Gold:** Resources, Supervision, Validation, Visualization, Writing – review & editing. **Elisha Riggs:** Resources, Supervision, Validation, Visualization, Writing – review & editing. **Julie Abimanyi-Ochom:** Resources, Supervision, Validation, Visualization, Writing – review & editing. **Linda Sweet:** Resources, Supervision, Validation, Visualization, Writing – review & editing. **Ha N.D. Le:** Supervision, Validation, Visualization, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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