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CLINICAL ARTICLE

# Maternal health and pregnancy outcomes among women of refugee background from Asian countries☆

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ABSTRACT

*Objective:* To compare maternal health, prenatal care, and pregnancy outcomes among women of refugee background (born in Asian humanitarian source countries [HSCs]) and non-refugee background (born in Asian non-HSCs) at Monash Health (Melbourne, VIC, Australia). *Methods:* In a retrospective study, data were obtained for women born in HSCs and non-HSCs from the same region who received government-funded health care for singleton pregnancies between 2002 and 2011. Multivariable regression analyses assessed associations between maternal HSC origin and pregnancy outcomes. *Results:* Data were included for 1930 women from South Asian HSCs and 7412 from non-HSCs, 107 from Southeast Asian HSCs and 5574 from non-HSCs, 287 from West Asian HSCs and 990 from non-HSCs. Overweight, anemia, and teenage pregnancy were generally more common in the HSC groups. Birth in an HSC was independently associated with poor/no pregnancy care attendance (OR 4.2; 95% CI 2.5–7.3), late booking visit (OR 1.3; 95% CI 1.1–1.5), and post-term birth (OR 3.0; 95% CI 2.0–4.5) among women from South Asia. For Southeast Asia, HSC birth was independently associated with labor induction (OR 2.0; 95% CI 1.1–3.5). No independent associations were recorded for West Asia. *Conclusion:* Women born in Afghanistan, Bhutan, Iraq, and Myanmar had poorer general maternal health. Those from South Asian HSCs had increased risks of lower engagement in prenatal care, and post-term birth.
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## 1. Introduction

In Australia, resettled refugees could have obtained humanitarian visas overseas through the Humanitarian Program, sought asylum after arrival in the country, or obtained non-humanitarian visas through the Family or Skilled Migration Programs [1]. Approximately 10 000–15 000 people come to Australia annually through the Humanitarian Program [2]. Between 2002 and 2011, the four countries with the highest number of Humanitarian Program arrivals in Australia were Afghanistan, Iraq, Myanmar (also known as Burma), and Sudan [3]. Afghanistan, Bhutan, Iraq, and Myanmar are key focuses of humanitarian migration programs globally [2,4,5]. Population-based research is needed to inform targeted developments in health service provision for women with refugee backgrounds who are from these countries.

Research on pregnancy outcomes among resettled refugee populations has largely focused on women from African countries. Women of refugee background from Africa and Europe have been reported to be at increased risk of perinatal mortality compared with women born in European resettlement countries [6]. However, little is known about pregnancy outcomes for women from Asian countries that are currently the source of humanitarian migrants (humanitarian source countries [HSCs]). In Australia, assessments of general health of refugees from Asian countries indicate poor preconception health, including nutritional deficiencies and infectious diseases [7,8].

Maternal origin (country of birth and/or ethnic origin) is an important contributor to pregnancy outcomes. For example, studies from Finland [9] and Pakistan [10] suggest migrant women from Afghanistan, Iraq, and Iran could have higher risks of adverse neonatal outcomes than do those born in resettlement countries. In Australia, women born in South Asia have been shown to have a higher risk of stillbirth than do Australian-born women [11]. Furthermore, women living in Australia who were born in South and Southeast Asia are at increased risk of

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gestational diabetes [12]. The aim of the present study was to compare maternal health, prenatal-care attendance, and pregnancy outcomes in women of refugee background (women born in Asian HSCs) and women of non-refugee background (women born in Asian non-HSCs) at a maternity center in Victoria, Australia.

## 2. Methods

In a retrospective study, data were obtained for women who received government-funded health care for singleton pregnancies at Monash Health between January 1, 2002, and December 31, 2011. National immigration data [3] for 2002–2011 were used to identify Asian countries of birth (COBs) from which at least two-thirds of the total immigrants entered Australia through the Humanitarian Program (i.e. HSCs), and Asian COBs from which less than one-third entered through the Humanitarian Program (i.e. non-HSCs). All women whose COB was an HSC were included in the analysis. From each Asian geographic region [13] represented in the HSC group, all women with COBs in the non-HSC category were selected as comparators. The study was reviewed by the Monash Health Human Research Ethics Committee Medical Administrator and deemed a quality assurance project (12110Q) not requiring informed consent due to use of existing, routinely collected, de-identified data.

Monash Health is Victoria's largest public health service and provides maternity services across three hospitals in Clayton, Dandenong, and Casey. Dandenong and Casey are major centers of refugee resettlement in Australia, receiving over 25% of Victoria's Humanitarian Program arrivals in 2010–2013 [1]. Of the approximately 6500 births annually at Monash Health in 2002–2011, 53% were to women born overseas, compared with 24% nationally [14].

Data were extracted from the Birthing Outcomes System, an electronic database recording all births after at least 20 weeks of pregnancy. Data are entered into this database at the first hospital pregnancy care (booking) visit and at birth, with routine data maintenance, cleaning, and validation. Postcodes of residence were matched to corresponding Index of Relative Socio-economic Disadvantage (IRSD) deciles [15], in which the most socioeconomically disadvantaged geographic areas are represented by 1, and the least disadvantaged areas by 10. Categories for maternal age, late booking visit (≥14 weeks of pregnancy), low 5-minute Apgar score (<7), low birth weight (<2500 g), preterm birth (<37 weeks of pregnancy), and post-term birth (>41 weeks gestation) were consistent with Australia's annual perinatal reports [14]. Poor attendance was defined as two or more booked pregnancy care visits missed. Onset of labor included spontaneous and induced.

Assisted vaginal births, third- or fourth-degree tears, and episiotomies were analyzed for vaginal births. Birth weight, low birth weight, 5-minute Apgar score, admission to special care nursery (SCN) or neonatal intensive care unit (NICU), and neonatal length of stay were analyzed for live births. Interpreter requirement was collected from 2008 and booking visit from 2009; body mass index (BMI; calculated as weight in kilograms divided by the square of height in meters) was collected from 2005 but consistently from 2008. Routine screening for vitamin D insufficiency/deficiency (25-OH vitamin D <75 nmol/L) was introduced in 2009.

Statistical analysis was performed with Stata version 12.1 (StataCorp, ollege Station, TX, USA). Categorical data are presented as count and proportions; groups were compared using Pearson $\chi^2$ tests or Fisher exact tests. Continuous data are presented as mean ± standard deviation or median and interquartile range, and groups compared using *t* tests or Mann–Whitney *U* tests. A two-sided *P* value of <0.05 was considered statistically significant. Univariable logistic or linear regression analysis generated crude odds ratios (ORs) or β-coefficients for associations between maternal HSC origin and pregnancy outcomes; non-symmetrically distributed outcomes were log-transformed. Multivariable regression analysis adjusted associations between HSC birth and pregnancy outcomes for maternal age (<20 years, 20–34 years [reference category], ≥35 years], parity (0 previous births [primiparity], ≥1 previous births [multiparity]), BMI (<18.5, 18.5–24.9 [reference category], 25.0–max) and IRSD (deciles 1–3, deciles 4–10). If the number of cases was small, covariate categories were collapsed or fewer covariates were included to avoid overfitting.

## 3. Results

The South Asian HSCs identified were Afghanistan and Bhutan; the non-HSCs were Bangladesh, India, the Maldives, Nepal, Pakistan, and Sri Lanka. The proportions of women from HSCs who required an interpreter, were younger than 20 years, were multiparous, had a BMI of at least 25.0, and had anemia were significantly higher than were the proportions of women from non-HSCs ($P<0.001$ for all) (Table 1). However, fewer women from HSCs than non-HSCs had a spouse, had had a previous cesarean, and had pre-existing diabetes ($P \leq 0.003$ for all) (Table 1).

In terms of pregnancy outcomes, larger proportions of the South Asian HSC group than the non-HSC group had late booking visits, poor/no pregnancy care attendance, or post-term birth ($P \leq 0.001$ for all) (Table 2). However, fewer women in the HSC group than in the non-HSC group developed gestational diabetes, had induced labor, delivered by cesarean, had a nulliparous term singleton vertex cesarean delivery, had an assisted vaginal birth, had third- or fourth-degree tears, had an episiotomy, had neonates with low birth weight, or had neonates who required SCN/NICU admission ($P \leq 0.003$) (Table 2). Mean birth weight was higher in the HSC group than the non-HSC group, while median maternal and neonatal lengths of stay were both shorter ($P<0.001$ for all) (Table 2).

Complete data for age, parity, BMI, and IRSD were available for 7379 women (5854 from non-HSCs and 1525 from HSCs). When adjusted for age, parity, BMI, and IRSD, birth in a South Asian HSC was positively associated with late booking visits, poor/no pregnancy care attendance, post-term birth, higher birth weight, and shorter maternal and neonatal lengths of stay (Table 2). Birth in an HSC was negatively associated with gestational diabetes, cesarean delivery, nulliparous term singleton vertex cesarean delivery, assisted vaginal birth, third- or fourth-degree tears, episiotomy, low birth weight, and SCN/NICU admission (Table 2).

The Southeast Asian non-HSCs identified were Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam; the only HSC was Myanmar. The proportions of women who required an interpreter, were younger than 20 years, were multiparous, had a BMI of at least 25.0, had anemia, and lived in a socioeconomically disadvantaged area were significantly higher among those from HSCs than non-HSCs ($P \leq 0.002$) (Table 1).

Fewer women from Southeast Asian HSCs than non-HSCs had preterm birth ($P = 0.04$), and neonatal length of stay was also significantly shorter among women from HSCs ($P = 0.04$) (Table 3). Complete data for age parity, BMI, and IRSD were available for 3599 women (3513 from non-HSCs and 86 from HSCs). When adjusted for maternal age, parity, BMI, and IRSD, birth in an HSC was positively associated with induced labor and negatively associated with late booking visits (Table 3).

The West Asian non-HSCs identified were Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, and the United Arab Emirates; the only HSC was Iraq. More women from HSCs than non-HSCs required an interpreter, were multiparous, and had a BMI of at least 25.0 ($P \leq 0.001$) (Table 1). However, the proportion of women who were younger than 20 years was lower among those from HSCs ($P = 0.02$) (Table 1).

Maternal and neonatal lengths of stay were significantly shorter among women from West Asian HSCs than among those from non-

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