





ORIGINAL ARTICLE

Ten years of a publicly funded homebirth service in Victoria: Maternal and neonatal outcomes

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Background: Rates of homebirth in Australia remain low, at less than 0.3% of all births.

Aims: To report maternal and neonatal outcomes of ten years of a publicly funded homebirth service, 2009–2019.

Method: Retrospective analysis of clinical outcome data including neonatal outcomes of women who requested a homebirth at a large metropolitan health service in Victoria, Australia. The primary outcomes included: maternal outcomes (mortality, transfer to hospital, place and mode of birth, perineal status, type of third stage of labour, postpartum haemorrhage), and neonatal outcomes (mortality, Apgar score at five minutes, birthweight, breastfeeding initiation, significant morbidity, transfer to hospital).

Results: Referrals for 827 women were reviewed; 633 remained eligible at 36 weeks gestation, and 473 (57%) birthed at home. Compared to women who did not, women who had a homebirth were significantly more likely to be multiparous, have a normal vaginal birth and an intact perineum, less likely to require suturing and less likely to have blood loss of more than 500 mL. Compared to infants not born at home, infants born at home were significantly less likely to require resuscitation, more likely to be of normal birthweight and exclusively receive breastmilk on discharge. There were no maternal deaths and one neonatal death of a baby born at home before the arrival of a midwife.

Conclusions: The outcomes for women accepted into the publicly funded homebirth program suggest appropriate triaging and case selection. A publicly funded homebirth program, with appropriate governance and clinical guidelines, appears to be a safe option for women experiencing low-risk pregnancies.

KEYWORDS

perinatal mortality, midwifery, continuity of patient care, home care services, hospital-based

INTRODUCTION

Most Australian women (96%) birth in a public or private hospital,^{1,2} with the remaining births occurring in midwifery-led birth centres, at home with a registered health professional (usually a midwife),³ or as freebirths (without the presence of a registered health professional).⁴ Unlike the United Kingdom and New Zealand where homebirth is an established and recognised birthing setting, in Australia homebirths account for only 0.3% of all births, and occur either under a fee-for-service model, where women employ a privately practising midwife (PPM) or doctor, or within a program embedded within a publicly funded health service which incurs no additional cost to women.^{2,3}

Research consistently shows that homebirth is a safe and effective model for women of low-risk pregnancy status.⁵⁻⁹ Despite this, publicly funded homebirth in Australia has remained contentious with advocates for and against this model of care.^{6,7,10-15} There are only 15 health services currently offering a homebirth program on Australia.¹⁶ In 2009 the Victorian Government commenced a homebirth pilot program across two sites, including the midwifery group practice (MGP) service at Western Health. In 2011, researchers from La Trobe University undertook an evaluation of the two Victorian homebirth programs;¹⁷⁻¹⁹ reassuring results supported the ongoing homebirth program at both sites. The presence of a publicly funded homebirth program for women experiencing low-risk pregnancy was identified to be an appropriate model, as it is seen as having seamless links to mainstream services should the need for transfer arise.³ However, since the initial evaluation, no large-scale analysis of clinical outcomes has occurred.

Midwifery-led continuity of care models, such as MGP, are associated with numerous benefits for both mothers and babies.²⁰ These benefits include lower intervention rates, improved infant health outcomes, greater satisfaction with care, and a perceived improved childbirth experience.²⁰ The Australian maternity services strategy is supportive of midwifery-led continuity of care

models with a focus on supporting women's preferences for care.¹ For midwifery staff, MGP, with its high level of job control, flexible working arrangements, supportive work partnerships and one-to-one care with women and their support people, is associated with greater job satisfaction and lower burnout rates than standard midwifery care.^{21,22} The homebirth service at Western Health is embedded in an all-risk MGP model.

The homebirth program at Western Health commenced recruiting women in 2009, with the first homebirth occurring in 2010. The program is available to women who have an uncomplicated pregnancy and no medical conditions likely to affect the pregnancy or birth. Once a referral is received, it is first reviewed by a MGP manager, and, if eligible, triaged to an accredited homebirth midwife. The woman's care is consistent with usual MGP care throughout pregnancy. At approximately 36 weeks gestation a collaborative assessment with an obstetrician is undertaken to review each woman's suitability for homebirth; if approved, the midwife then undertakes a home visit to ensure the home is safe for a homebirth with easy access in the case of an emergency event. If deemed appropriate, the requisite equipment is provided (eg oxytocics, lignocaine, vitamin K, oxygen equipment) to the woman. Only following these assessments is the homebirth plan confirmed. A key component of an appropriately governed homebirth program is to ensure that risk is mitigated to limit poor outcomes while allowing women to access the service when suitable. The inclusion/exclusion criteria have changed over time, with the current criteria shown in Table 1. Some women are excluded at initial referral, some enter the program and change their mind, and for others, their clinical circumstances change, and they are transferred out of the homebirth program, continuing care with their MGP midwife. This paper provides maternal and neonatal outcomes from the first ten years of this publicly funded homebirth service in Australia, demonstrates the reasons for change in care model, and compares the outcomes for those deemed ineligible for the program with those who progressed to labour and/or birth at home.

TABLE 1 Current inclusion and exclusion criteria for the public homebirth program

Inclusion	Exclusion
<ul style="list-style-type: none"> • Singleton pregnancy with cephalic presentation. • Remains 'green pathway'; the local term for low-risk pregnancy. • Labours at 37–42 weeks gestation • Resides within 30 min travelling time to Western Health, calculated using 'WAZE' (www.waze.com < http://www.waze.com/) at the standard time of midday (12 pm). • Has Ambulance Service cover. • Agrees to transfer to hospital according to the Agreed Transfer to Hospital Plan and agrees with Homebirth Program Information Sheet with her primary midwife. • Has a home environment that is assessed as safe and aligned to Occupational Health and Safety Procedures for Home Visit. • Completed a Homebirth Program Birth Plan. • Has someone that can be at home with her for the first 24 h following birth. 	<ul style="list-style-type: none"> • Previous caesarean section • Maternal age >40 years • Parity >4 • History of postpartum haemorrhage, manual removal of placenta, shoulder dystocia, previous baby >4500 g • Current body mass index >35 kg/m², diabetes mellitus (excluding diet-controlled gestational diabetes), small or large for gestational age fetus, fetal disorders, placental disorders, endocrine disorders, infectious diseases, liver, or renal disorders, haematological or neurological disorders. • Declines routine testing including morphology ultrasound, oral glucose tolerance test, full blood examination.

MATERIALS AND METHODS

Ethics approval was granted from Western Health Low Risk Ethics Committee (HREC/19/WH/59365) with reciprocal approval from Deakin University (2019-474). Women included in this study were identified from sources including the patient administration system (iPM), Birthing Outcomes System (BOS), and MGP outcome records. Women who were recorded as requesting a homebirth were included in this analysis; this included women who birthed at Western Health or elsewhere. Data from iPM, BOS, and MGP outcome records were extracted and matched by maternal unit record identifier and year of birth. Any duplicates or discrepancies were investigated and resolved on a case-by-case basis.

Data on eligibility and place of birth were summarised using descriptive statistics to populate a flowchart showing women's pathways from referral to the homebirth program to birth.

Birth and neonatal outcomes were only available for women who gave birth at this health service; therefore, there are missing data for those who gave birth at another health service or in the care of private midwives. For women who did not give birth at this health service, maternal age at birth was estimated based on the mother's date of birth and the baby's due date. The number of valid cases is provided for each analysis.

Maternal, birth, and neonatal outcomes for women who birthed at home were compared firstly with outcomes for those who were referred to the program but did not birth at home. Secondly, these outcomes were compared with outcomes for women who commenced labour at home but did not achieve a homebirth.

χ^2 tests were conducted to compare categorical outcomes; continuity corrections were applied in the case of binary outcomes. All continuous outcomes were non-normally distributed; hence non-parametric tests (Mann-Whitney *U* or Kruskal Wallis) were used to compare these outcomes. However, we present means for ease of interpretation. To adjust for multiple tests and the associated increased risk of type one errors, statistical significance was set at $P < 0.001$.²³

RESULTS

From 2009 to 2019, 827 women were referred for a homebirth; [Figure 1](#) outlines the outcome pathway for all these women and provides details of the reasons for exclusion. Of the 827 women, 633 were still eligible for homebirth at their 36 weeks collaborative assessment and home site visit. From the initial referral to commencement of labour, 561 (67.8%) remained eligible and commenced labour at home. From the onset of labour, 78 (13.9%) were transferred out of the program, there were 27 postnatal maternal transfers, and 13 neonatal transfers. A total of 483 women birthed at home within the homebirth program from 2010 to 2019, representing 0.93% of all births at the health service.

The demographic characteristics and outcomes of all women and babies who were referred to the homebirth program are shown in [Table 2](#). There was a significantly higher proportion of multipara (parity 1–4), and lower proportion of nullipara, among women who had a homebirth compared to women who did not have a homebirth.

There were no maternal deaths. Compared to women who did not have a homebirth, women who had a homebirth were found to have: a significantly higher proportion of normal vaginal births; a lower proportion of assisted vaginal births and caesarean sections; a significantly higher proportion of waterbirths, and lower proportions of semi-recumbent or supported sitting or use of birth stool, lateral and lithotomy positions; a significantly higher proportion of first degree tear/perineal graze, and lower proportion of episiotomy; a significantly lower portion required suturing; a significantly higher proportion of expectant, and lower proportions of active or manual, management of third stage of labour; and a significantly higher proportion of postpartum blood loss less than 500 mL, and lower proportions of 500–1000 mL and more than 1000 mL postpartum blood loss.

There was one neonatal death of an infant born at home before arrival of the midwife. Compared to infants of women who did not have a homebirth, infants born at home were significantly less likely to require resuscitation, were more likely to have a birth weight over 4000 g and less likely to have a birth weight below 2500 g. Babies born at home were more likely to breastfeed and less likely to receive formula at discharge. There were ten babies born at home before arrival of a midwife, most with the midwives arriving within five minutes of the birth, maximum ten minutes. In all these cases the woman/support person was instructed to call an ambulance if the woman commenced pushing, and all had precipitate labours. One of these babies was born breech – undiagnosed pre-labour and birthed in good condition.

From the 827 women referred for homebirth, 190 (23.0%) were, or became, ineligible for the homebirth program before 36 weeks gestation. Women who changed their mind about wanting a homebirth cited a lack of partner or family support for a homebirth. Of those women who were deemed ineligible for the homebirth service, 26 elected to transfer to a PPM. There were 72 (11.4%) women who were transferred out of the homebirth program after the collaborative assessment. Outcome data for all women ($N = 561$) who commenced labour at home and their babies are shown in [Table 3](#).

Compared to women who commenced labour at home but did not achieve homebirth, women who achieved homebirth achieved better maternal outcomes (see [Table 3](#)). Compared to infants of women who commenced labour at home but did not have a homebirth, infants born at home were significantly less likely to require resuscitation.

DISCUSSION

This study contributes to the evidence of the safety of publicly funded homebirth programs in Australia. Over the past

decade the use of eligibility criteria to determine which women are suitable for homebirth (required to be low-risk) has resulted in reassuring outcomes with low complication rates and very low intervention rates. This is the first study to outline the reasons why women become ineligible and to analyse the differences in outcomes between those eligible for a homebirth with those deemed ineligible or who remove themselves from the program. The results suggest that the criteria used in determining suitability to birth at home result in appropriate risk mitigation with women not approved for homebirth having higher rates of intervention and poorer outcomes.

Over the ten-year period, the inclusion and exclusion criteria have been reviewed and adapted to meet contemporary practice and in response to identified issues. For example, a recent modification is the inclusion of women with gestational diabetes provided they are diet-controlled. Some exclusion criteria are more contentious than others, particularly the use of a defined maximum safe distance from the hospital. Previously, the program considered women eligible if they lived up to a maximum of approximately 30–40 min from the hospital. This somewhat flexible time limit led to repeated, often protracted negotiation and a desire to stretch a little further than what was considered to be safe; it also absorbed considerable amounts of staff time. While any maximum transfer time is arbitrary, it is important to have a limit to support positive outcomes in the event of a transfer for high-risk reasons such as a post-partum haemorrhage. In 2017 a strict 30 min limit was introduced and while any time or distance limit can result in women falling outside the limit by only small amounts resulting in considerable distress,²⁴ the stricter limit has resulted in far fewer requests for special consideration.

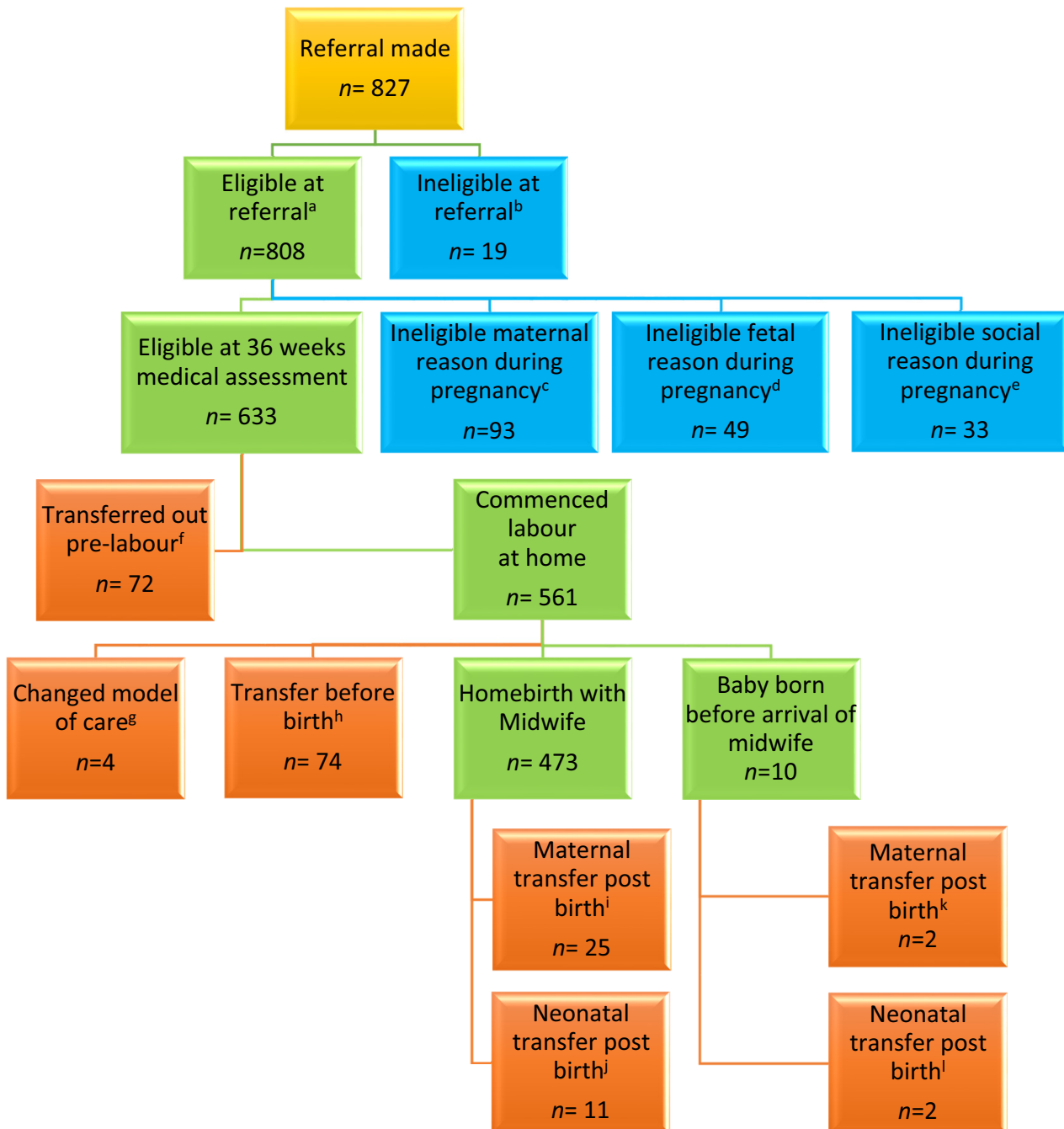
The maternal and neonatal outcomes in this study are comparable with other studies of homebirth for women whose pregnancies are considered low-risk.^{7,25,26} Overall, outcome data are

reassuring with low rates of homebirth neonatal resuscitation and low rates of depressed Apgar scores at five minutes. Women who did not remain in the homebirth program, had a higher chance of requiring an intervention such as operative vaginal birth or caesarean section, while women who commenced labour at home had less perineal trauma, were more likely to choose physiological management of third stage of labour and had less severe post-partum haemorrhages. Despite the lower rate of active management of third stage of labour in homebirths, only 5.6% had blood loss of more than 500 mL, again a rate lower than the Australian national average.²⁷

Ten women birthed before arrival of a midwife; the single neonatal death, in 2012, occurred in circumstances of a midwife not being present at the birth that occurred in water. The case was investigated by the Coroner of Victoria, with adjustments to the operational aspects of the program including strict advice to not enter a birthing pool, prior to the attendance of a midwife.²⁸ Despite these changes, unattended births still occasionally occur (as shown in Figure 1). A notable issue is that while there is a requirement that the intended location of birth is within a 30-min transfer time to a maternity hospital, the maximum distance, and therefore time to attendance, of a midwife from the home is not mandated. Timely communication with the midwife when labour commences enables timely attendance.

The rate of transfers out of the homebirth program from the time of approval at the 36-week collaborative assessment and home check and before onset of labour was 11.4% ($n = 72$), all for appropriate management of obstetric conditions (see Figure 1 notes). Of those women who commenced labour at home, the homebirth guidelines required transfer to hospital of 74 (13.2%) women for labour management and 36 women and four babies (combined 7.1%) following birth. These transfer rates (combined 20.3%) are higher than previously documented transfer rates

FIGURE 1 Flow chart showing clinical pathways for women referred to the homebirth program. ^aEligible at referral: met the inclusion criteria for homebirth program described in the introduction. ^bIneligible at referral: ineligible area ($n = 2$), ineligible maternal ($n = 16$), and changed model of care at booking (due to rules of program) ($n = 1$). ^cIneligible maternal reason in pregnancy: maternal pregnancy conditions included gestational diabetes mellitus ($n = 29$), preterm birth ($n = 9$), antepartum haemorrhage ($n = 7$), thrombocytopenia ($n = 6$), polyhydramnios ($n = 5$), refused to have requisite tests ($n = 5$), oligohydramnios ($n = 4$), cholestasis ($n = 4$), pre-eclampsia ($n = 4$), unable to complete home visit in time ($n = 3$), pregnancy-induced hypertension ($n = 3$), placenta praevia ($n = 2$), induction of labour for decreased fetal movements ($n = 2$), induction of labour for pelvic instability ($n = 1$), postural orthostatic tachycardia syndrome ($n = 1$), maternal tachycardia ($n = 1$), grand multiparity ($n = 1$), body mass index $> 35 \text{ kg/m}^2$ ($n = 1$), history of postpartum haemorrhage ($n = 1$), Mother only had one kidney ($n = 1$), low haemoglobin ($n = 1$), history of shoulder dystocia ($n = 1$), migraine and syncope ($n = 1$). ^dIneligible fetal reason: pre-approval diagnosis of breech ($n = 17$), small for gestational age ($n = 12$), large for gestational age ($n = 10$), fetal anomalies (cardiac and renal) ($n = 6$), fetal death in utero ($n = 4$). ^eIneligible social reason: outside of geographical area ($n = 5$), change of mind ($n = 28$). ^fTransfer out pre-labour: pre-labour rupture of membranes ($n = 27$), pre-labour rupture of membranes + meconium stained liquor ($n = 9$), post-dates ($n = 26$), induction of labour for decreased fetal movements ($n = 7$), anhydramnios ($n = 2$), maternal seizure ($n = 1$). ^gChanged model of care: did not call homebirth midwife ($n = 2$), presented at hospital in labour ($n = 2$). ^hTransfer in labour before birth: meconium stained liquor ($n = 36$), prolonged first stage of labour ($n = 17$), fetal distress ($n = 5$), pain relief ($n = 5$), breech diagnosed ($n = 4$), prolonged second stage ($n = 4$), antepartum haemorrhage in labour ($n = 1$), cord presentation at spontaneous rupture of membranes ($n = 1$), vomiting and dehydration ($n = 1$). ⁱMaternal transfer after birth with midwife: postpartum haemorrhage ($n = 20$), third degree perineal trauma ($n = 4$), fourth degree perineal trauma ($n = 1$). ^jNeonatal transfer after birth with midwife: medical condition ($n = 8$), social (to accompany mother) ($n = 3$). ^kMaternal transfer after 'born before arrival': third degree perineal trauma ($n = 1$), fourth degree perineal trauma ($n = 1$). ^lNeonatal transfer after 'born before arrival': medical condition ($n = 2$).



for homebirth in Australia, which was said to be 10% for low-risk women.²⁵ However, a systematic review of homebirth transfers has shown a range from 9.9 to 31.9%²⁹ and a study from the United Kingdom found rates to be 14.2% intrapartum and 6.2% postpartum for women only (neonatal transfer rates were not mentioned).³⁰ The authors of the systematic review recommended future studies report the reasons for transfer, which this study has achieved. A more recent study from Spain, showed an intrapartum transfer rate of 14.4% and postpartum rate of 2.3% for women and 1.2% for babies.²⁶ However, their documented reasons for transfer are quite different from the findings in our study with meconium stained liquor not even mentioned. There were four women who did not call the homebirth midwife, two

choosing to freebirth and two attending the hospital in labour. Avoidance of the risk associated with freebirthing is an important consideration in a homebirth service,⁴ and because of these, the guidelines have changed, such as recommending women not to enter a birth pool until the arrival of a midwife.

Strengths of this study are the sample size included, and that all data were sourced from clinical case records, not relying on recall. Coding of the primary reason for ineligibility or transfer was cross-checked independently by two authors (authors one and eight). This is the first study to demonstrate the various points in time women become ineligible or leave a homebirth service, and to track outcomes for not only those who birthed at home, but those women seeking homebirth and not achieving it. Similarly,

TABLE 2 Demographic characteristics and outcomes of women and babies who were referred to the homebirth program

Characteristic (n)†	Value	Total cohort	Had a homebirth	Did not have homebirth	Significance
			No. (%)	No. (%)	
Maternal age, years <i>n</i> = 827	<25	64 (7.7)	38 (7.9)	26 (7.6)	Ns
	26-35	564 (68.2)	330 (68.3)	234 (68.0)	
	36-40	180 (21.8)	108 (22.4)	72 (20.9)	
	>40	19 (2.3)	7 (1.4)	12 (3.5)	
Parity <i>n</i> = 825	Nullipara	328 (39.8)	131 (27.1)	197 (57.6)	<0.001*
	Multipara (1-4)	492 (59.6)	350 (72.5)	142 (41.5)	
	Multipara (>4)	5 (0.6)	2 (0.4)	3 (0.9)	
Speak English at home <i>n</i> = 821	Yes - English	817 (99.5)	479 (99.4)	339 (99.7)	Ns
	No - other	4 (0.5)	3 (0.6)	1 (0.3)	
Maternal ethnicity <i>n</i> = 760	Aboriginal and/or Torres Strait Islander	10 (1.3)	5 (1.1)	5 (1.6)	Ns
	Non-Aboriginal and/or Torres Strait Islander	750 (98.7)	442 (98.9)	308 (98.4)	
Maternal country of birth <i>n</i> = 757	Australia	533 (70.4)	328 (73.4)	205 (66.1)	Ns
	Other‡	224 (29.6)	119 (26.6)	105 (33.9)	
Marital status <i>n</i> = 759	Married or in a de facto partnership	650 (85.6)	391 (88.1)	259 (82.2)	Ns
	Single, separated or divorced	109 (14.4)	53 (11.9)	56 (17.8)	
Maternal mortality <i>n</i> = 783	Yes	0	0 (0)	0 (0)	Ns
	No	783	483 (100)	300 (100)	
Mode of birth <i>n</i> = 783	Normal vaginal birth	700 (89.4)	482 (99.8)	218 (72.7)	<0.001
	Vaginal breech	3 (0.4)	1 (0.2)	2 (0.7)	
	Assisted vaginal birth	27 (3.4)	0	27 (9.0)	
	Caesarean section	53 (6.8)	0	53 (17.7)	
Position for vaginal birth, excludes all lower segment caesarean section <i>n</i> = 730	Waterbirth	288 (39.5)	264 (54.5)	24 (9.8)	<0.001
	All fours	187 (25.6)	118 (24.4)	69 (28.0)	
	Squatting or standing	88 (12.1)	57 (11.8)	31 (12.6)	
	Semi-recumbent or supported sitting or birth stool	86 (11.8)	31 (6.4)	55 (22.4)	
	Lateral	35 (4.8)	13 (2.7)	22 (8.9)	
	Lithotomy	46 (6.3)	1 (0.2)	45 (18.3)	
Perineal status <i>n</i> = 784	Intact	291 (37.1)	185 (38.3)	106 (35.2)	<0.001
	Graze/1st degree tear	269 (34.3)	189 (39.1)	80 (26.6)	
	2nd degree tear	175 (22.3)	100 (20.7)	75 (24.9)	
	3rd or 4th degree tear	15 (1.9)	6 (1.2)	9 (3.0)	
	Episiotomy	34 (4.3)	3 (0.6)	31 (10.3)	
Suturing performed <i>n</i> = 784	No	537 (68.5)	373 (77.2)	164 (54.5)	<0.001
	Yes	247 (31.5)	110 (22.8)	137 (45.5)	
Management of 3rd stage of labour, excludes lower segment caesarean section <i>n</i> = 738	Manual removal of placenta	18 (2.4)	3 (0.6)	15 (5.9)	<0.001
	Expectant	402 (54.5)	348 (72.0)	54 (21.2)	
	Active	318 (43.1)	132 (27.3)	186 (72.9)	
Postpartum blood loss <i>n</i> = 784	<500 mL	684 (87.2)	456 (94.4)	228 (75.7)	<0.001
	500-1000 mL	51 (16.9)	15 (3.1)	51 (16.9)	
	>1000 mL	22 (7.3)	12 (2.5)	22 (7.3)	

(Continues)

TABLE 2 (Continued)

Characteristic (n)†	Value	Total cohort	Had a homebirth	Did not have homebirth	Significance
			No. (%)	No. (%)	
Maternal blood transfusion <i>n</i> = 783	No	765 (97.7)	474 (98.1)	291 (97.0)	Ns
	Yes	18 (2.3)	9 (1.9)	9 (3.0)	
Neonatal mortality <i>n</i> = 783	Live born	778 (99.4)	482 (99.8)	296 (98.7)	Ns
	Stillborn	4 (0.5)	0	4 (1.3)	
	Early neonatal death	1 (0.1)	1 (0.2)	0	
Neonate gestation at birth <i>n</i> = 783	<37 completed weeks	18 (2.3)	0 (0)	18 (6.0)	<0.001
	37–42 completed weeks	749 (95.7)	481 (99.6)	268 (89.3)	
	>42 weeks	16 (2.0)	2 (0.4)	14 (4.7)	
Apgar score at 5 min <i>n</i> = 776	<7	15 (1.9)	6 (1.3)	9 (3.0)	Ns
	7–10	761 (98.1)	472 (98.7)	289 (97.0)	
Neonatal resuscitation required <i>n</i> = 784	Yes	54 (6.9)	20 (4.1)	34 (11.3)	<0.001
	Tactile or suction only	181 (23.1)	90 (18.6)	91 (30.2)	
	No	549 (70.0)	373 (77.2)	176 (58.5)	
Neonatal birthweight, g <i>n</i> = 776	<2500	10 (1.3)	1 (0.2)	9 (3.0)	<0.001
	2500–4000	636 (82.0)	387 (80.6)	249 (84.1)	
	>4000	130 (16.8)	92 (19.2)	38 (12.8)	
Neonatal admission to newborn services <i>n</i> = 783	Yes	16 (2.0)	6 (1.2)	10 (3.3)	Ns
	No	767 (98.0)	477 (98.8)	290 (96.7)	
Neonatal morbidity, infant may have more than one condition <i>n</i> = 79	Birth trauma	21	2	19	N/A
	Respiratory	30	7	23	
	Sepsis	20	3	17	
	Blood glucose monitoring	13	1	12	
	Jaundice	11	4	7	
	Other§	4	0	4	
	Congenital abnormality	6	1	5	
	Chromosomal abnormality	2	2	0	
Infant 1st feed <i>n</i> = 774	Breastfeed or expressed breastmilk only	765 (98.8)	478 (99.4)	287 (98.0)	Ns
	Mixed feed	2 (0.3)	1 (0.2)	1 (0.3)	
	Formula feed	1 (0.1)	0 (0)	1 (0.3)	
	No feed given	6 (0.8)	2 (0.4)	4 (1.4)	
Infant last feed <i>n</i> = 769	Breastfeed or expressed breastmilk only	756 (98.3)	477 (99.8)	279 (95.9)	<0.001*
	Mixed feed	11 (1.4)	1 (0.2)	10 (3.4)	
	Formula feed	2 (0.3)	0 (0)	2 (0.7)	

†Valid *n* varies owing to missing data (not stated/inadequately described/data unavailable for women who did not birth at this health service).

‡Country of birth other: next most prevalent New Zealand (52), United Kingdom (26), United States (14), and Germany (10).

§Other: anaemia, hypoxic ischaemic encephalopathy, seizures, hypothermia

*Results should be interpreted with caution as some subgroups compared in the analysis were small

we are the first to identify the reasons women were unable to have a homebirth, providing accurate clinical risk information. The majority (70.4%) of participants in this study were born in Australia with the next three most prevalent countries being English-speaking countries (equating to 76% of sample) which is consistent with national data which shows 73% of mothers were born in English-speaking countries.² Limitations are the missing

data, particularly when women commenced within the homebirth program and then transferred to an alternate health service or maternity care provider. Birth and neonatal data were not available for these cases. Similarly, in the early years of the program, records were not kept of women who requested a homebirth and were deemed ineligible at first point of contact – so the true rates of interest in the program are unknown.

TABLE 3 Maternal and neonatal outcomes for women who commenced labour in the homebirth program

Characteristic <i>n</i> †	Value	Total women commenced labour at home (<i>N</i> = 561)	Had a homebirth (<i>N</i> = 483)	Did not have homebirth (<i>N</i> = 78)	Significance
			No. (%)	No. (%)	
Maternal mortality <i>n</i> = 561	Yes	0 (0)	0 (0)	0 (0)	
	No	561 (100)	483 (100)	78 (100)	
Maternal parity <i>n</i> = 561	Nullipara	199 (35.5)	131 (27.1)	68 (87.2)	<0.001
	Multipara (1–4)	360 (64.2)	350 (72.5)	10 (12.8)	
	Multipara (>4)	2 (0.4)	2 (0.4)	0 (0)	
Mode of birth <i>n</i> = 558	Normal vaginal birth	531 (95.2)	482 (99.8)	49 (65.3)	<0.001
	Vaginal breech	1 (0.2)	1 (0.2)	0 (0)	
	Assisted vaginal birth	11 (2.0)	0	11 (14.7)	
	Caesarean section	15 (2.7)	0	15 (20.0)	
Position for vaginal birth, excludes all lower segment caesarean section <i>n</i> = 543	Waterbirth	266 (49.0)	264 (54.5)	2 (3.3)	<0.001
	All fours	130 (23.9)	118 (24.4)	12 (20.0)	
	Squatting or standing	62 (11.4)	57 (11.8)	5 (8.3)	
	Semi-recumbent or supported sitting or birth stool	46 (8.5)	31 (6.4)	16 (26.7)	
	Lateral	21 (3.9)	13 (2.7)	8 (13.3)	
	Lithotomy	18 (3.3)	1 (0.2)	17 (28.3)	
Maternal perineal status <i>n</i> = 559	Intact	208 (37.2)	185 (38.3)	23 (30.3)	<0.001
	Graze/1st degree tear	208 (37.2)	189 (39.1)	19 (25.0)	
	2nd degree tear	118 (21.1)	100 (20.7)	18 (23.7)	
	3rd or 4th degree tear	8 (1.4)	6 (1.2)	2 (2.6)	
	Episiotomy	17 (3.0)	3 (0.6)	14 (18.4)	
Suturing performed <i>n</i> = 561	No	408 (73.0)	373 (77.2)	35 (46.1)	<0.001
	Yes	151 (27.0)	110 (22.8)	41 (53.9)	
Management of 3rd stage of labour <i>n</i> = 546	Manual removal of placenta	8 (1.5)	3 (0.6)	5 (7.9)	<0.001
	Expectant	360 (65.9)	348 (72.0)	12 (19.0)	
	Active	178 (32.6)	132 (27.3)	46 (73.0)	
Maternal postpartum blood loss <i>n</i> = 559	<500 mL	512 (91.6)	456 (94.4)	56 (73.7)	<0.001
	500–1000 mL	32 (5.7)	15 (3.1)	17 (22.4)	
	>1000 mL	15 (2.7)	12 (2.5)	3 (3.9)	
Maternal blood transfusion <i>n</i> = 558	No	547 (98.0)	474 (98.1)	73 (97.3)	Ns
	Yes	11 (2.0)	9 (1.9)	2 (2.7)	
Neonatal mortality <i>n</i> = 558	Live born	557 (9.8)	482 (99.8)	75 (100.0)	Ns
	Neonatal death	1 (0.2)	1 (0.2)	0 (0)	
Neonatal gestation at birth <i>n</i> = 558	37–42 completed weeks	556 (99.6)	481 (99.6)	75 (100)	Ns
	>42 weeks	2 (0.4)	2 (0.4)	0 (0)	
Neonatal Apgar score at 5 min <i>n</i> = 553	<7	8 (1.4)	6 (1.3)	2 (2.7)	Ns
	7–10	545 (98.6)	472 (98.7)	73 (97.3)	
Neonatal resuscitation required <i>n</i> = 559	Yes	32 (5.7)	20 (4.1)	12 (15.8)	<0.001
	Tactile or suction only	113 (20.2)	90 (18.6)	23 (30.3)	
	No	414 (74.1)	373 (77.2)	41 (53.9)	

(Continues)

TABLE 3 (Continued)

Characteristic <i>n</i> †	Value	Total women commenced labour at home (<i>N</i> = 561)	Had a homebirth (<i>N</i> = 483)	Did not have homebirth (<i>N</i> = 78)	Significance
			No. (%)	No. (%)	
Neonatal birthweight, g <i>n</i> = 554	<2500	2 (0.4)	1 (0.2)	1 (1.4)	Ns
	2500–4000	452 (81.6)	387 (80.6)	65 (87.8)	
	>4000	554 (18.1)	92 (19.2)	8 (10.8)	
Neonate admission to newborn services <i>n</i> = 558	Yes	12 (2.2)	6 (1.2)	6 (8.0)	Ns
	No	546 (97.8)	477 (98.8)	69 (92.0)	
Neonatal morbidity, infant may have more than one condition <i>n</i> = 32	Birth trauma	6	2	4	N/A
	Respiratory	17	7	10	
	Sepsis	9	3	6	
	Blood glucose monitoring	2	1	1	
	Jaundice	6	4	2	
	Congenital abnormality	1	1	0	
	Chromosomal abnormality	2	2	0	
Infant first feed <i>n</i> = 555	Breastfeed or expressed breastmilk only	72 (97.3)	478 (99.4)	550 (99.1)	Ns
	Mixed feed	1 (1.4)	1 (0.2)	2 (0.4)	
	Formula feed	0 (0)	0 (0)	0 (0)	
	No feed given	1 (1.4)	2 (0.4)	3 (0.5)	
Infant last feed on discharge <i>n</i> = 551	Breastfeed or expressed breastmilk only	547 (99.3)	477 (99.8)	70 (95.9)	Ns
	Mixed feed	4 (0.7)	1 (0.2)	3 (4.1)	
	Formula feed	0 (0)	0 (0)	0 (0)	

Ns, not statistically significant.

†Valid *n* varies owing to missing data/data unavailable for babies not born at this health service.

While we have compared the clinical outcomes of women who achieved a homebirth with those who did not, interpretation must be made with caution as the groups are not comparable due to the clinical conditions that arose during pregnancy. In addition, some results should be interpreted with caution owing to small numbers in some cells in the cross-tabulation. Future research comparing women in homebirth programs vs those with similar risk profiles who birth in hospital is highly recommended.

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