

Women's Self-Reported Outcomes of Water Immersion for Labour and Birth in Australia: Findings from a National Cross-Sectional Survey

Megan Cooper

Megan.Cooper@uq.edu.au

The University of Queensland

Claire Feeley

King's College London

Valerie Slavin

Griffith University

Ethel Burns

Oxford Brookes University

Bethan Townsend

Sunshine Coast University Hospital

Lauren Kearney

The University of Queensland

Research Article

Keywords: Water immersion, Hydrotherapy, Labour, Obstetric, Natural childbirth, Perineum, Postpartum haemorrhage

Posted Date: October 12th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11137945/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Access to water immersion (WI) for labour and birth in Australia is inconsistent despite growing evidence of safety and acceptability. Women's self-reported experiences and outcomes across diverse birth settings remain underrepresented. Rising rates of birth trauma, highlighted in the 2023 NSW Legislative Council Inquiry, emphasise the need for equitable access to preferred pain management options. Situating women's water immersion experiences within Respectful Maternity Care and the National Woman-Centred Care Framework frames access as a rights and equity issue.

Aim

To describe women's self-reported clinical outcomes of water immersion across Australian settings and interpret findings through a woman-centred, Respectful Maternity Care lens.

Methods

A national cross-sectional online survey of Australian women (n = 875) who used water immersion for labour and/or birth (November 2016–October 2017). Descriptive analyses report frequencies and proportions.

Results

Up to three episodes per respondent yielded 1,265 instances. Waterbirth occurred in 66.0% (n = 775/1,174). Homebirth was common (48.1%), followed by public hospital (35.7%). Vaginal birth predominated (n = 1,091), with low caesarean (2.3%) and instrumental (3.2%) rates. Intact perineum was reported in 63.8% (n = 735/1,152). Postpartum haemorrhage occurred in 10.9% (n = 126/1,152), with most women exiting the pool before placental birth (76.1%). Neonatal support was required in 7.2% (n = 83/1,149). Adverse events were rare. Among those leaving the pool during labour common reasons included needing the toilet (30.3%) and clinician request (8.2%).

Conclusions

Women report safe, favourable water immersion outcomes across settings. Repeat use (37.3%) indicates sustained acceptability. These findings support equitable access to water immersion as a safe, valued intrapartum option.

Background

Australia's maternity system has experienced a sustained increase in obstetric intervention. In 2023, 39.8% of women gave birth by caesarean section, up from 33% in 2014, and epidural use and induction rates have similarly risen (1, 2). Researchers attribute this trajectory to the medicalisation of childbirth and dominance of technocratic care models (3, 4), defensive clinical practice driven by litigation (5–7), and rising rates of maternal comorbidities (8, 9). The result is a system increasingly defined by risk stratification in which birth is framed through a lens of pathology rather than physiology (10–12). The human cost is under urgent scrutiny: the 2023 NSW Legislative Council Inquiry into Birth Trauma heard from hundreds of women who described preventable harm arising from lack of choice and care that failed to respect their autonomy and dignity (13). Approximately one third of women experience their birth as traumatic, with access to physiological birth options identified as a key protective factor (13, 14).

Within this context, water immersion (WI) — the use of warm water in a purpose-built bath or birthing pool during labour and/or birth — has emerged as a meaningful non-pharmacological option that supports physiological birth and aligns with woman-centred care principles (15–17). Systematic review evidence indicates no increase in adverse maternal or neonatal outcomes associated with WI during labour, and moderate-quality evidence supports its use for reducing regional analgesia in the first stage (18). Burns et al.'s systematic review and meta-analysis of 157,000 mother-baby dyads confirmed reductions in episiotomy rates and postpartum haemorrhage (PPH) (19). Women who access WI consistently report greater sense of control, improved comfort, and more positive birth experiences (15, 16, 20, 21).

Despite this evidence, access to WI in Australia is inconsistent and governed by widely varying facility-level policies (10, 22–25). Whilst the Australian College of Midwives (ACM) supports women's choice to use WI across all stages of labour and birth (26), many hospitals restrict or discourage its use due to policy constraints, staff confidence, and facility capacity (10, 24, 25, 27, 28). Common concerns raised against WI including neonatal infection and cord avulsion are often presented without adequately contextualising their low absolute frequency (29, 30). Positioning WI access as a component of Respectful Maternity Care, defined by the World Health Organization (WHO) as care that maintains dignity, privacy, and enables informed choice (31), requires that the evidence base be robust, population-level, and inclusive of women's own voices.

Much of what is known about WI outcomes has been derived from observational studies in hospital settings (32, 33). These studies may not capture the breadth of experiences across homebirth, birth centre, and private hospital settings. Large-scale Australian data quantitatively describing women's self-reported clinical outcomes across all birth settings remain absent, representing a significant gap in the evidence base. To fill this gap, this paper reports a descriptive analysis of women's self-reported clinical outcomes from a national Australian WI survey (n = 875; 1,265 WI instances). The aim is to describe women's self-reported clinical outcomes of WI across settings in Australia, and to frame these findings through a contemporary woman-centred and Respectful Maternity Care lens (31, 34).

Methods

This paper stems from a wider study exploring women's experiences of WI via a national cross-sectional study of Australian women who used WI for labour and/or birth (20). While data were collected between November 2016 and October 2017, to date, there remains no study that has captured women's self-reported experiences of using water immersion for labour and/or birth to this degree. We therefore hold that it addresses a significant gap in the literature.

The survey was designed to capture women's experiences and self-reported outcomes across up to three WI birth episodes, with identical outcome items at each episode to facilitate comparison and pooling of episodes. A bespoke instrument, underpinned by evidence, was developed by the research team; content and face validity were established through expert review prior to dissemination (20). The survey captured: demographic characteristics; birth setting; antenatal care provider; gestational age at labour onset; pool use patterns; intrapartum interventions; pain relief use; mode of birth; perineal outcomes; haemorrhage; third stage management; neonatal outcomes; adverse events; and postnatal requirements among other data. Survey questions were not compulsory to protect participant autonomy; denominators therefore vary between items. The survey was hosted online and distributed via midwifery organisations, maternity consumer networks including the Maternity Consumer Network, and social media platforms. For a detailed overview, refer to a previously published paper (20).

Australian women aged 18 years or older who had used WI for labour and/or birth were eligible to participate. Purposive and snowball sampling strategies were employed to maximise responses. Participation was voluntary and anonymous.

Quantitative data were analysed descriptively. Frequencies and proportions were calculated for all categorical outcome variables, stratified by birth episode and in total. Missing data were excluded from percentage denominators. Analyses were conducted using IBM SPSS Statistics.

Ethics approval

was obtained from [HREC] (Ethics Protocol #[X], date [X]). Consent was implied by survey completion and submission. Participants were informed of their right to withdraw at any time and of the voluntary, anonymous nature of participation. Identifying information was stored separately from survey responses.

Results

Sample characteristics

A total of 875 women constituted the analytical sample. Participants were predominantly aged 30–39 years (58.1%), degree-educated (45.0% Bachelor degree), and with largest representation from New South Wales (28.8%) (see Table 1).

Table 1
Sample characteristics (n = 875)

Characteristic	n	%
Age		
< 20 years	3	0.3
20–29 years	208	23.7
30–39 years	510	58.1
40–49 years	130	14.8
Prefer not to answer	27	3.1
Highest education		
Primary school	1	0.1
Secondary school	72	8.2
Diploma/Certificate	208	23.7
Bachelor degree	395	45.0
Masters/Honours degree	164	18.7
PhD	11	1.2
Other	27	3.1
State or Territory of Residence		
New South Wales (NSW)	253	28.8
South Australia (SA)	206	23.5
Queensland (QLD)	161	18.3
Victoria (VIC)	120	13.7
Western Australia (WA)	74	8.4
Tasmania (TAS)	30	3.4
Northern Territory (NT)	18	2.1
Australian Capital Territory (ACT)	16	1.8

Water immersion episodes and birth context

A total of 1,265 WI instances were reported: 875 at the first (most recent) episode, 322 at the second, and 68 at the third (least recent). A total of 326 women (37.3%) used WI for at least two births, and 68 (7.8%) for three births, reflecting high repeat use. Waterbirth occurred in 775 of 1,174 episodes (66.0%),

with rates of 68.2% at the first episode, 62.3% at the second, and 57.4% at the third. Homebirth was the most common setting across all episodes (48.1%), followed by public hospital (35.7%) and birth centre (10.6%). Private hospital use was low (3.7%), with markedly lower waterbirth rates (first episode 20.6%; second episode 0%). The predominant antenatal care model was independent or midwifery group practice/caseload (MGP) midwifery (> 70% at each episode). Full data are presented in Table 2.

Mode of birth

Mode of birth data were available for 772 of 875 first-episode respondents, 277 of 322 second-episode respondents, and 42 of 68 third-episode respondents. Across all three episodes with data (n = 1,091), 94.5% (n = 1,031) of births were vaginal, 2.3% (n = 25) were by caesarean section, and 3.2% (n = 35) were instrumental (forceps or ventouse). These rates were consistent across episodes. Among the 313 women who laboured in water but birthed on land at EP1 and 2, 81.5% had a vaginal birth, 8.0% a caesarean section, and 10.5% an instrumental birth. Mode of birth data are presented in Table 2.

Pool use and the intrapartum context

52.7% of women (n = 624/1,184) left the pool at some point during labour; (of those, 51.7% (n = 321/621) returned), the most common self-reported reason for leaving was needing to use the toilet (30.3%), followed by slow progress (18.9%), having had enough of the water (18.4%), and discomfort (17.3%). 8.2% of women (n = 51/624) reported being told to get out by a clinician. Women could select multiple reasons; percentages therefore exceed 100%. Full data on reasons for leaving are presented in Table 3.

Intrapartum interventions were infrequent. Artificial rupture of membranes (ARM) was reported in 12.4% of all WI instances (n = 172/1,167), and oxytocin augmentation in 4.2% (n = 58/1,167). Across all episodes with complete data, 67.6% of WI instances had no documented intrapartum intervention.

Additional pain relief options were used by 53.7% of women (n = 631/1,175) and these were predominantly non-pharmacological. Full data are presented in Table 2.

Intrapartum transfer from home or birth centre to a hospital where pool access was unavailable accounted for 23 responses (15.9%). Labour not progressing or a prolonged second stage was identified in 22 responses (15.2%). Clinical concerns including fetal heart rate abnormality (n = 13, 9.0%), meconium (n = 8, 5.5%), and shoulder dystocia (n = 7, 4.8%) prompted exit. Policy and institutional restrictions on waterbirth including Vaginal Birth after Caesarean status, GBS-positive status, and hospital-level policy were reported in 17 responses (11.7%), including women who described being refused permission to return to the pool during the second stage. Three women described clinician pressure or coercion, including two accounts of a midwife draining the pool without consent. Responses to all predefined options are included in Table 4.

Third stage management

Physiological management of the third stage predominated across all episodes (62.2%), compared with active management (oxytocin) in 35.1% (Table 2). The majority of women (76.1%, n = 882/1,159) left the pool for placental birth. Notably, 21.5% (n = 249/1,159) remained in the pool for the birth of the placenta.

Postpartum haemorrhage

Self-reported PPH was reported in 10.9% of all WI instances with complete data (n = 126/1,152). An additional 2.8% (n = 32/1,152) were unsure. A significant secondary bleed more than 24 hours after birth was reported in 1.3% (n = 14/1,122) of all episodes. See Table 2 for all data.

Perineal outcomes

An intact perineum was reported in 63.8% of all episodes (n = 735/1,152). A perineal tear requiring suturing was reported in 35.9% (n = 414/1,152). The rates of perineal trauma by degree of tear across all episodes were: 8.4% first degree; 18.1% second degree, and 3.6% third- and fourth degree (obstetric anal sphincter injury, OASI). Episiotomy was reported in 5.4% of all WI instances (n = 60/1,122). For all data see Table 2.

Neonatal outcomes

Neonatal supportive care was required in 7.2% of births (n = 83/1,149) and was consistent across all three episodes (see Table 2). Across all reported episodes, oxygen therapy was the most common (3.3%), followed by nursery admission (1.5%). No neonatal deaths were identified.

Adverse events

Adverse events were rare across all episodes. Cord avulsion (1.3%) was the most commonly reported adverse event followed by shoulder dystocia (1.9%). Maternal collapse or syncope was reported in nine instances across all episodes (0.8%) with only one occurring in the bath. No maternal deaths were identified. The majority of episodes (82.7%, n = 928/1,122) had no adverse event recorded. For all data see Table 2.

Table 2

Women's self-reported clinical outcomes and birth characteristics by water immersion episode

Outcome	1st WI episode (most recent)	2nd WI episode	3rd WI episode (least recent)	Total across all episodes
GESTATION AT ONSET OF LABOUR				
Total with data	n = 875	n = 322	n = 68	n = 1,265
< 34 weeks	2 (0.2%)	0 (0%)	1 (1.5%)	3 (0.2%)
34–37 weeks	6 (0.7%)	4 (1.2%)	1 (1.5%)	11 (0.9%)
37–40 weeks	361 (41.3%)	124 (38.0%)	27 (39.7%)	512 (40.3%)
40–42 weeks	480 (54.9%)	189 (58.0%)	37 (54.4%)	706 (55.6%)
> 42 weeks	26 (3.0%)	9 (2.8%)	2 (2.9%)	37 (2.9%)
ANTENATAL CARE PROVIDER				
Total with data	n = 866	n = 322	n = 68	n = 1,256
MGP/caseload midwife	317 (32.2%)	121 (37.0%)	28 (38.4%)	466 (33.7%)
Independent midwife	308 (31.3%)	129 (39.6%)	24 (32.9%)	461 (36.6%)
Midwifery clinic	106 (10.8%)	37 (11.4%)	8 (11.0%)	151 (12.0%)
Obstetrician	55 (5.6%)	20 (6.1%)	4 (5.5%)	79 (6.3%)
General practitioner	31 (3.6%)	10 (3.1%)	1 (1.5%)	42 (3.3%)
No care provider	6 (0.7%)	2 (0.6%)	0 (0%)	8 (0.6%)
Other	37 (4.3%)	7 (2.2%)	3 (4.4%)	47 (3.7%)
BIRTH SETTING				
Total with data	n = 866	n = 322	n = 68	n = 1,256
Home	418 (48.3%)	153 (47.5%)	33 (48.5%)	604 (48.1%)
Public hospital	319 (36.8%)	108 (33.5%)	22 (30.1%)	449 (35.7%)
Birth centre	85 (9.8%)	38 (11.8%)	10 (14.7%)	133 (10.6%)
Private hospital	34 (3.9%)	11 (3.4%)	2 (2.9%)	47 (3.7%)

Outcome	1st WI episode (most recent)	2nd WI episode	3rd WI episode (least recent)	Total across all episodes
GESTATION AT ONSET OF LABOUR				
Total with data	n = 875	n = 322	n = 68	n = 1,265
Other	10 (1.2%)	12 (3.7%)	1 (1.5%)	23 (1.8%)
WATERBIRTH AND POOL USE				
Total with data	n = 809	n = 307	n = 68	n = 1,184
Left pool at any point during labour	425 (52.5%)	160 (52.1%)	39 (57.4%)	624 (52.7%)
Returned to pool (of those who left)	232/423 (54.9%)	71/159 (44.7%)	18/39 (46.2%)	321/621 (51.7%)
Gave birth in pool (waterbirth)*	n = 801	n = 305	n = 68	n = 1,174*
Waterbirth	546 (68.2%)	190 (62.3%)	39 (57.4%)	775 (66.0%)
– Homebirth setting	330/418 (79.0%)	113/148 (76.4%)	–	–
– Public hospital	143/319 (44.8%)	43/99 (43.4%)	–	–
– Birth centre	62/85 (72.9%)	28/36 (77.8%)	–	–
– Private hospital	7/34 (20.6%)	0/11 (0%)	–	–
MODE OF BIRTH				
Total with data†	n = 772	n = 277	n = 42	n = 1,091
Vaginal birth	733 (94.9%)	258 (93.1%)	40 (95.2%)	1,031 (94.5%)
Caesarean section	19 (2.5%)	6 (2.2%)	0 (0%)	25 (2.3%)
Instrumental birth (forceps/ventouse)	20 (2.6%)	13 (4.7%)	2 (4.8%)	35 (3.2%)
Waterbirth – all vaginal (n = 546 EP1)	546/546 (100%)	190/190 (100%)	39/39 (100%)	–
Land birth – vaginal (n = 226 EP1)	187/226 (82.7%)	68/87 (78.2%)	–	–

Outcome	1st WI episode (most recent)	2nd WI episode	3rd WI episode (least recent)	Total across all episodes
GESTATION AT ONSET OF LABOUR				
Total with data	n = 875	n = 322	n = 68	n = 1,265
Land birth — caesarean (n = 226 EP1)	19/226 (8.4%)	6/87 (6.9%)	—	—
Land birth — instrumental (n = 226 EP1)	20/226 (8.8%)	13/87 (14.9%)	—	—
INTRAPARTUM INTERVENTIONS				
Total with data	n = 798	n = 301	n = 68	n = 1,167
Artificial rupture of membranes (ARM)	115 (14.4%)	45 (15.0%)	12 (17.7%)	172 (12.4%)
Oxytocin augmentation	41 (5.1%)	14 (4.7%)	3 (4.4%)	58 (4.2%)
No intrapartum intervention	642 (80.5%)	240 (79.7%)	53 (77.9%)	935 (67.6%)
Other	45 (5.6%)	20 (6.6%)	3 (4.4%)	68 (5.8%)
PAIN RELIEF				
Any additional pain relief alongside WI	n = 801	n = 306	n = 68	n = 1,175
Any additional pain relief	422 (52.7%)	173 (56.5%)	36 (52.9%)	631 (53.7%)
Type (among those using additional relief)	n = 422	n = 173	n = 36	n = 631
Nitrous oxide/Entonox	140 (33.2%)	60 (34.7%)	8 (22.2%)	208 (33.0%)
Epidural	39 (9.2%)	24 (13.9%)	3 (8.3%)	66 (10.5%)
Opioids (pethidine/morphine)	21 (5.0%)	11 (3.4%)	5 (6.8%)	37 (2.7%)
Massage	199 (47.2%)	87 (50.3%)	—	286 (45.3%)
Heat pack	143 (33.9%)	65 (37.6%)	—	208 (33.0%)
Hypnobirthing/meditation	180 (42.7%)	60 (34.7%)	1 (2.8%)	241 (38.2%)
Shower	179 (42.4%)	65 (37.6%)	14 (38.9%)	258 (40.9%)
TENS machine	79 (18.7%)	25 (14.5%)	10 (27.8%)	114 (18.1%)

Outcome	1st WI episode (most recent)	2nd WI episode	3rd WI episode (least recent)	Total across all episodes
GESTATION AT ONSET OF LABOUR				
Total with data	n = 875	n = 322	n = 68	n = 1,265
Acupuncture/acupressure	55 (13.0%)	24 (13.9%)	12 (33.3%)	91 (14.4%)
THIRD STAGE MANAGEMENT				
Total with data	n = 790	n = 303	n = 66	n = 1,159
Active management (oxytocin)	275 (34.8%)	107 (35.3%)	25 (37.9%)	407 (35.1%)
Physiological management	484 (61.3%)	188 (62.0%)	40 (60.6%)	721 (62.2%)
Left pool for birth of placenta	601 (76.1%)	229 (75.6%)	52 (78.8%)	882 (76.1%)
Stayed in pool for birth of placenta	176 (22.3%)	61 (20.1%)	12 (18.2%)	249 (21.5%)
HAEMORRHAGE				
Total with data	n = 784	n = 303	n = 65	n = 1,152
Postpartum haemorrhage (PPH)	91 (11.6%)	30 (9.9%)	5 (7.7%)	126 (10.9%)
Can't be sure (PPH)	26 (3.3%)	6 (2.0%)	0 (0%)	32 (2.8%)
Significant bleed > 24h post-birth	10/763 (1.3%)	4/297 (1.4%)	0/62 (0%)	14/1,122 (1.3%)
PERINEAL OUTCOMES				
Total with data	n = 784	n = 303	n = 65	n = 1,152
Intact perineum	518 (66.1%)	178 (58.7%)	39 (60.0%)	735 (63.8%)
Perineal tear requiring suturing	265 (33.8%)	123 (40.6%)	26 (40.0%)	414 (35.9%)
Degree (among those with suture- requiring tears)	n = 265	n = 123	n = 26	n = 414
1st degree	58 (21.9%)	33 (26.8%)	6 (23.1%)	97 (23.4%)
2nd degree	131 (49.4%)	62 (50.4%)	16 (61.5%)	209 (50.5%)
3rd degree (OASI)†	27 (10.2%)	9 (7.3%)	1 (3.9%)	37 (8.9%)

Outcome	1st WI episode (most recent)	2nd WI episode	3rd WI episode (least recent)	Total across all episodes
GESTATION AT ONSET OF LABOUR				
Total with data	n = 875	n = 322	n = 68	n = 1,265
4th degree (OASI)	3 (1.1%)	1 (0.8%)	0 (0%)	4 (1.0%)
Episiotomy	41/763 (5.4%)	18/297 (6.1%)	1/62 (1.6%)	60/1,122 (5.4%)
NEONATAL OUTCOMES				
Total with data	n = 782	n = 302	n = 65	n = 1,149
Baby required any supportive care	56 (7.2%)	22 (7.3%)	5 (7.7%)	83 (7.2%)
Type (among those requiring care)	n = 56	n = 22	n = 5	n = 83
Oxygen therapy	22 (38.6%)	14 (63.6%)	2 (40.0%)	38 (45.8%)
Resuscitation	11 (19.3%)	2 (9.1%)	3 (60.0%)	16 (19.3%)
Nursery admission	11 (19.3%)	5 (22.7%)	1 (20.0%)	17 (20.5%)
Antibiotics for neonatal infection	12 (21.1%)	4 (18.2%)	0 (0%)	16 (19.3%)
Transfer to another hospital	4 (7.0%)	1 (4.6%)	0 (0%)	5 (6.0%)
ADVERSE EVENTS				
Total with data	n = 763	n = 297	n = 62	n = 1,122
Umbilical cord avulsion	12 (1.6%)	2 (0.7%)	0 (0%)	14 (1.3%)
Shoulder dystocia	15 (2.0%)	5 (1.7%)	1 (1.6%)	21 (1.9%)
Maternal infection	13 (1.3%)	5 (1.5%)	1 (1.6%)	18 (1.6%)
Manual removal of placenta	29 (1.0%)	10 (1.2%)	4 (6.5%)	43 (3.8%)
Maternal collapse/syncope in bath	1 (0.1%)	0 (0%)	0 (0%)	1 (0.1%)
Maternal collapse/syncope after bath	5 (0.7%)	3 (1.0%)	0 (0%)	8 (0.7%)
No adverse event	630 (82.6%)	244 (82.2%)	54 (87.1%)	928 (82.7%)

* The denominator for total waterbirth rate is 1,174 (those who answered the birth mode question), not 1,269 (total WI instances). Denominators vary between items as questions were not compulsory. † Mode of birth data were available for n = 772 (EP1), n = 277 (EP2), and n = 42 (EP3). The cross-tabulation of

waterbirth vs land birth by mode of birth is reported for EP1 and EP2. WI = water immersion; OASI = obstetric anal sphincter injury; ARM = artificial rupture of membranes; TENS = transcutaneous electrical nerve stimulation; MGP = midwifery group practice. '-' indicates data not available or not reported for this episode.

Table 3
Reasons for leaving the pool during labour (n = 624)

Reason for leaving pool	EP1 (n = 425)	EP2 (n = 160)	EP3 (n = 39)	Total n (n = 624)	Total %
I needed to go to the toilet	124	53	12	189	30.3%
I wasn't progressing	74	37	7	118	18.9%
I'd had enough	74	33	8	115	18.4%
I was uncomfortable	72	30	6	108	17.3%
I was too hot	38	11	2	51	8.2%
I was told to get out	31	15	5	51	8.2%
So my midwife/obstetrician could perform observations	15	8	4	27	4.3%
I didn't like it	21	4	2	27	4.3%
My baby's heart rate was abnormal	21	9	3	33	5.3%
I needed stronger pain relief	19	5	2	26	4.2%
I was too tired	15	11	0	26	4.2%
My contractions stopped	18	4	4	26	4.2%
I was too cold	15	5	1	21	3.4%
The water became dirty/contaminated	12	3	0	15	2.4%
I was bleeding	5	0	0	5	0.8%
Change of shift, told to get out	2	1	2	5	0.8%
<i>Note: Women could select multiple reasons; percentages therefore exceed 100%. EP1 = first (most recent) WI episode; EP2 = second WI episode; EP3 = third WI episode.</i>					

Table 4

Reasons for leaving the pool/bath for the birth (land birth), by episode of care (n = 399 episodes; multi-select)

Reason for leaving for birth	EP1 n = 255 n (%)	EP2 n = 115 n (%)	EP3 n = 29 n (%)	Total n = 399 n (%)
Other	88 (34.5%)	46 (40.0%)	11 (37.9%)	145 (36.3%)
Wasn't progressing	54 (21.2%)	32 (27.8%)	10 (34.5%)	96 (24.1%)
Had enough	53 (20.8%)	24 (20.9%)	6 (20.7%)	83 (20.8%)
Uncomfortable	62 (24.3%)	17 (14.8%)	4 (13.8%)	83 (20.8%)
Vaginal examination (midwife/obs)	49 (19.2%)	17 (14.8%)	3 (10.3%)	69 (17.3%)
Told to get out (clinician-directed)	33 (12.9%)	17 (14.8%)	6 (20.7%)	56 (14.0%)
Hospital/birth place didn't allow waterbirth	27 (10.6%)	14 (12.2%)	5 (17.2%)	46 (11.5%)
Needed instrumental birth (forceps/ventouse)	21 (8.2%)	11 (9.6%)	2 (6.9%)	34 (8.5%)
Too hot	21 (8.2%)	7 (6.1%)	2 (6.9%)	30 (7.5%)
Needed stronger pain relief	21 (8.2%)	6 (5.2%)	1 (3.4%)	28 (7.0%)
Didn't like it	18 (7.1%)	3 (2.6%)	3 (10.3%)	24 (6.0%)
Too tired	15 (5.9%)	6 (5.2%)	3 (10.3%)	24 (6.0%)
Midwife/obs observations (e.g. BP)	13 (5.1%)	7 (6.1%)	2 (6.9%)	22 (5.5%)
Emergency situation	14 (5.5%)	7 (6.1%)	1 (3.4%)	22 (5.5%)
Needed a caesarean section	12 (4.7%)	7 (6.1%)	2 (6.9%)	21 (5.3%)
Too cold	10 (3.9%)	5 (4.3%)	2 (6.9%)	17 (4.3%)
Needed to go to the toilet	4 (1.6%)	9 (7.8%)	2 (6.9%)	15 (3.8%)
Water became dirty/contaminated	5 (2.0%)	2 (1.7%)	1 (3.4%)	8 (2.0%)
Was bleeding	4 (1.6%)	1 (0.9%)	1 (3.4%)	6 (1.5%)
Change of shift, told to get out	2 (0.8%)	1 (0.9%)	2 (6.9%)	5 (1.3%)

Reason for leaving for birth	EP1	EP2	EP3	Total
	n = 255	n = 115	n = 29	n = 399
	n (%)	n (%)	n (%)	n (%)
Worried baby might drown	2 (0.8%)	1 (0.9%)	1 (3.4%)	4 (1.0%)

Note: Women could select multiple reasons; percentages therefore exceed 100%. EP1 = first (most recent) WI episode; EP2 = second WI episode; EP3 = third WI episode.

Discussion

This study presents the largest known Australian survey dataset of women's self-reported clinical outcomes from WI for labour and birth, contributing data across all states and territories from 875 women reporting 1,265 WI instances. The findings are broadly consistent with the clinical literature. Framed within Respectful Maternity Care and the National Woman-Centred Care Framework (31, 35), these data support the case for equitable access to WI as a safe, woman-valued intrapartum option.

Mode of birth in context

The overall caesarean section rate across all three episodes was 2.3% (n = 25/1,091). This is much lower than the 2023 Australian population caesarean rate of 39.8% (1). The spontaneous vaginal birth rate in this study was almost 95% compared to the 48.4% reflected in 2023 across Australia (1). These differences almost certainly reflect selection bias: women who use WI are disproportionately low-risk and birth in midwifery-led and homebirth settings with strong physiological birth orientations. The higher caesarean and instrumental rates among land births within this WI cohort likely reflect women who entered the pool but required transfer of care due to clinical complexity. These findings are consistent with systematic review evidence that midwifery-led physiological birth pathways are associated with lower intervention rates (18, 19).

Perineal outcomes

The intact perineum rate of 63.8% exceeds Australian population benchmarks. AIHW data indicate only 23.9% of Australian women had an intact perineum following birth in 2017, declining to approximately 18% by 2023 (36). This finding is consistent with clinical evidence that WI is associated with reduced perineal trauma (18, 19). Women who participated in this study and who gave birth in water sustained perineal trauma at roughly half the rate of those who did not (27.0% versus 53.8%), consistent with existing comparative evidence (18, 19). The modest numerical decline in intact perineum rate from first to second episode (66.1% to 58.7%) is consistent with the expected relationship between increasing parity and perineal integrity.

The OASI rate of 8.9% among those with suture-requiring tears warrants contextualisation. Women not explicitly told their tear degree by clinicians may misreport or be unable to accurately classify their injury;

women who experienced an OASI may also be more likely to recall and report it. However, the overall OASI incidence (3.6%) across all WI episodes is broadly comparable with rates in clinical WI literature (32, 37). The episiotomy rate of 5.4% is very low, consistent with WI literature showing substantial reductions associated with physiological birth models (13).

Third stage, postpartum haemorrhage (PPH) and placental birth in the pool

The PPH rate of 10.9% is consistent with published population rates for physiological and WI births (19, 38). An important interpretive consideration is that 76.1% of women left the pool prior to placental birth; accordingly, most PPH events in this sample are likely to have occurred on land. Notably, 21.5% of women remained in the pool for the birth of the placenta. Current guidance in many Australian settings routinely recommends pool exit for third stage, yet evidence specifically examining placental birth in water and PPH risk is sparse. These data challenge the assumption that routine pool exit for third stage is necessary on haemorrhage-prevention grounds and support the need for further research (39, 40). The rate of physiological third stage (62.2%) in this cohort substantially exceeds population norms and is consistent with the midwifery-led, homebirth-predominant profile of the sample.

Neonatal outcomes

The neonatal supportive care rate of 7.2% was consistent across all three birth episodes, suggesting stability across repeated WI use. These rates are comparable with those reported in the POOL cohort study especially when separated out into the various reasons neonates needed supportive care (37). Though these results should be interpreted with the understanding that waterbirth eligibility is typically restricted to low-risk women it is important to note that these data reflect many homebirths supported by privately practising midwives who care for women of varying levels of risk. No neonatal deaths were identified. These findings are broadly consistent with Burns and colleagues' meta-analysis, which found no increase in neonatal infection, resuscitation requirements, or neonatal death in WI groups compared with standard care (19).

Adverse events in context

Adverse events were rare. Cord avulsion occurred in 1.3% of births, consistent with published estimates from clinical WI studies (19). No study, including this survey, has demonstrated that cord avulsion in water is associated with increased neonatal mortality or serious morbidity when attended by a skilled practitioner. Clinical debate about WI safety has disproportionately amplified rare adverse events from case reports without adequately contextualising their frequency relative to land birth. This survey provides a population-level perspective on adverse event frequency largely absent from smaller controlled studies.

High repeat use and access inequity

A total of 37.3% of women used WI for at least two births and 7.8% for three births. These repeat use rates are compelling indicators of sustained acceptability. Repeat use across heterogeneous birth

settings including public hospitals, birth centres, and homebirth suggests that the acceptability of WI is not confined to any single care model or population subgroup. The striking variation in waterbirth rates by setting reflects documented structural inequities in WI access (10, 22, 28). Private hospital birth, produced the lowest waterbirth rate, likely reflecting obstetrician-led care models, relative scarcity of midwifery-led birth options, and absence of birthing pools in many private hospitals (10, 23, 41). The data presented here, consistent with the broader clinical literature, do not support the contention that WI is unsafe. Rather, access barriers are structural, institutional, and rooted in technocratic care models (16, 22).

Reasons for leaving the pool and Respectful, Woman-Centred Maternity Care

The data on reasons for leaving the pool (Table 3) provide important insight into the WI experience. The most common reason was needing the toilet (30.3%), reflecting a straightforward physiological need. Of greater clinical and policy interest, 8.2% of women reported being told to get out by a clinician – representing a clinician-directed pool exit that appeared not to be driven by clinical urgency (such as abnormal fetal heart rate, reported by 5.3%). The qualitative free-text responses elaborated these patterns further. Among women who selected ‘other’ as their reason for not birthing in the pool, a recurring theme was institutional restriction – including VBAC status, GBS-positive status, and facility policy – preventing waterbirth even when women and their midwives supported it. Two women described their care provider draining the pool without consent while the woman was crowning, representing both a violation of bodily autonomy during birth and risk to the baby. This finding warrants attention against Respectful Maternity Care principles and what is understood to constitute woman-centred care (31, 34), as removing a woman from the pool without clear clinical indication is inconsistent with principles of informed decision making, self-determination and dignity. The WHO definition of Respectful Maternity Care (RMC) explicitly includes the right to refuse interventions and to be free from non-consented procedures (31). Pool drainage without consent, or refusal to permit return to the pool without clinical justification, could constitute a breach of these principles.

Strengths and limitations

The dataset represents the largest known population-level Australian data on women's self-reported WI outcomes. Despite the data being collected in 2016–2017, no comparable national dataset has been published since. The persistence of evidence gaps in this area makes these data uniquely valuable for policy and clinical guidance on equitable WI access across all Australian birth settings.

Several limitations should be acknowledged. Recruitment via self-selection through maternity consumer and advocacy networks likely produced a sample with pre-existing positive orientation toward WI, introducing selection bias. Women who experienced adverse outcomes may be less likely to have participated. The sample is educationally skewed toward higher education and does not adequately represent First Nations women, women from culturally and linguistically diverse backgrounds, or women in rural and remote settings.

Clinical outcomes were self-reported and not validated against medical records, limiting precision for outcomes such as PPH, degree of perineal tear, and neonatal diagnoses. The OASI rate of 8.9% among those with suture-requiring tears should be interpreted with particular caution: women are not always informed of their exact tear classification and recall of specific tear degree carries known accuracy limitations. Denominators vary across items due to voluntary survey response, introducing potential item-level non-response bias. Recall bias is possible for women reporting on births preceding the 2016–2017 survey period.

Conclusion

This national cross-sectional survey of 875 Australian women's self-reported outcomes of WI for labour and birth yielding 1,265 WI instances across all states and territories provides the most comprehensive population-level data of WI outcomes from women's own perspective available in Australia. The high repeat use of WI reflects sustained acceptability mirroring wider qualitative literature. Clinically, high rates of intact perineum, low PPH, infrequent adverse events, and an overall low rate of neonatal supportive care rates across all birth episodes and settings are broadly consistent with the clinical literature. Notably, the high rate of placental waterbirths with no accompanying adverse events provide novel insights challenging typical guidelines that recommend land placental birth. However, of concern was the marked variation in waterbirth rates reflecting structural access inequities unrelated to safety. Our novel findings revealed that 8.2% of women were told to exit by a clinician, a finding that warrants reflection and further investigation. Positioned against the Respectful Maternity Care Framework, the National Woman-Centred Care Strategic Directions for Maternity Care and the findings of the NSW birth trauma inquiry, these data provide important woman-generated evidence to support the case for expanding equitable access to WI across Australian maternity services. Policy and practice should align with this evidence and training is urgently needed.

Declarations

Ethical Statement

[Ethics committee name], approval number [X], date of approval [X]. Consent was implied by completion and submission of the survey. Participants were informed of their right to withdraw at any time and that the survey was anonymous and voluntary.

Consent for publication

Not applicable.

Competing Interests

The authors declare no competing interests.

Funding

This study received no funding.

Availability of data and materials

The data generated and analysed during this study are not publicly available because they contain women's self-reported maternity experiences, including potentially sensitive free-text responses. De-identified data may be available from the corresponding author on reasonable request, subject to the conditions of the original ethics approval and applicable data-sharing requirements.

Acknowledgements

The authors thank all women who participated in this survey, and the Australian maternity organisations and networks who assisted with recruitment, including the Australian College of Midwives and social media groups who supported distribution of the survey.

Authors' information

Not applicable.

Authors' contribution

Megan Cooper Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Validation; Visualization; Writing - review & editing.

Claire Feeley Formal analysis; Validation; Visualization; Writing - review & editing.

Valerie Slavin Formal analysis; Validation; Visualization; Writing - review & editing.

Ethel Burns Formal analysis; Validation; Visualization; Writing - review & editing.

Bethan Townsend Formal analysis; Validation; Visualization; Writing - review & editing.

Lauren Kearney Formal analysis; Validation; Visualization; Writing - original draft; Writing - review & editing.

References

1. Australian Institute of Health and Welfare (AIHW). National Perinatal Data Collection annual update 2023—data tables. Canberra: AIHW; 2025.
2. Australian Institute of Health and Welfare (AIHW). Australia's mothers and babies 2014 — in brief. Perinatal statistics series no. 32. Canberra: AIHW; 2016.
3. Davis-Floyd R. The technocratic, humanistic, and holistic paradigms of childbirth. *Int J Gynecol Obstet*. 2001;75:S5–23.
4. Westergren A, Edin K, Lindkvist M, Christianson M. Exploring the medicalisation of childbirth through women's preferences for and use of pain relief. *Women Birth*. 2021;34(2):e118–27. <https://doi.org/10.1016/j.wombi.2020.02.009>.
5. Hood L, Fenwick J, Butt J. A story of scrutiny and fear: Australian midwives' experiences of an external review of obstetric services, being involved with litigation and the impact on clinical practice. *Midwifery*. 2010;26(3):268–85.
6. Bryers HM, Van Teijlingen E. Risk, theory, social and medical models: a critical analysis of the concept of risk in maternity care. *Midwifery*. 2010;26(5):488–96.
7. Robertson JH, Thomson AM. An exploration of the effects of clinical negligence litigation on the practice of midwives in England: A phenomenological study. *Midwifery*. 2016;33:55–63.
8. Marchi J, Berg M, Dencker A, Olander E, Begley C. Risks associated with obesity in pregnancy, for the mother and baby: a systematic review of reviews. *Obes Rev*. 2015;16(8):621–38.
9. Mengistu TS, Turner JM, Flatley C, Fox J, Kumar S. The Impact of Severe Maternal Morbidity on Perinatal Outcomes in High Income Countries: Systematic Review and Meta-Analysis. *J Clin Med*. 2020;9(7). Epub 20200629. 10.3390/jcm9072035. PubMed PMID: 32610499; PubMed Central PMCID: PMC7409239.
10. Cooper M, McCutcheon H, Warland J. A critical analysis of Australian policies and guidelines for water immersion during labour and birth. *Women Birth*. 2017;30(5):431–41.
11. Lane K. Dreaming the impossible dream: ordering risks in Australian maternity care policies. *Health Sociol Rev*. 2012;21(1):23–35.
12. Brundell K, Vasilevski V, Sweet L. Australian maternity care, considering risk and supporting safety: A scoping review. *Midwifery*. 2022;112:103408. <https://doi.org/10.1016/j.midw.2022.103408>.
13. New South Wales Parliament Legislative Council. Inquiry into Birth Trauma: Final Report. Sydney: NSW Parliament; 2024.
14. Keedle H, Lockwood R, Keedle W, Susic D, Dahlen HG. What women want if they were to have another baby: the Australian Birth Experience Study (BEST) cross-sectional national survey. *BMJ open*. 2023;13(9):e071582.
15. Cooper M, Briley A. Sense of coherence as facilitated by water immersion during labour and birth: A concept analysis and synthesis. *Midwifery*. 2023;126:103824.
16. Feeley C, Cooper M, Burns E. A systematic meta-thematic synthesis to examine the views and experiences of women following water immersion during labour and waterbirth. *J Adv Nurs*.

- 2021;77(7):2942–56.
17. Clews C, Church S, Ekberg M. Women and waterbirth: A systematic meta-synthesis of qualitative studies. *Women Birth*. 2020;33(6):566–73.
 18. Cluett ER, Burns E, Cuthbert A. Immersion in water during labour and birth. *Cochrane Database Syst Rev*. 2018;5(5):CD000111.
 19. Burns E, Feeley C, Hall PJ, Vanderlaan J. Systematic review and meta-analysis to examine intrapartum interventions, and maternal and neonatal outcomes following immersion in water during labour and waterbirth. *BMJ open*. 2022;12(7):e056517.
 20. Cooper M, Warland J. What are the benefits? Are they concerned? Women's experiences of water immersion for labor and birth. *Midwifery*. 2019;79:102541.
<https://doi.org/10.1016/j.midw.2019.102541>.
 21. Ulfsdottir H, Saltvedt S, Ekborn M, Georgsson S. Like an empowering micro-home: a qualitative study of women's experience of giving birth in water. *Midwifery*. 2018;67:26–31.
 22. Cooper M, Madeley A-M, Burns E, Feeley C. Understanding the barriers and facilitators related to birthing pool use from organisational and multi-professional perspectives: a mixed-methods systematic review. *Reproductive health*. 2023;20(1):147.
 23. Cooper M, McCutcheon H, Warland J. They follow the wants and needs of an institution': Midwives' views of water immersion. *Women Birth*. 2021;34(2):e178–87.
 24. Cooper M, Warland J, McCutcheon H. Practitioner accreditation for the practice of water immersion during labour and birth: results from a mixed methods study. *Women Birth*. 2019;32(3):255–62.
 25. Cooper M, Warland J, McCutcheon H. Australian midwives views and experiences of practice and politics related to water immersion for labour and birth: a web based survey. *Women Birth*. 2018;31(3):184–93.
 26. Australian College of Midwives (ACM). Position Statement: Use of Water Immersion for Labour and/or Birth. Canberra: ACM; 2023.
 27. Cooper M, McCutcheon H, Warland J. Water immersion policies and guidelines: How are they informed? *Women Birth*. 2019;32(3):246–54.
 28. Plint E, Davis D. Sink or swim: water immersion for labor and birth in a tertiary maternity unit in Australia. *Int J Childbirth*. 2016;6(4):206–22.
 29. Pinette MG, Wax J, Wilson E. The risks of underwater birth. *Am J Obstet Gynecol*. 2004;190(5):1211–5.
 30. Taylor H, Kleine I, Bewley S, Loucaides E, Sutcliffe A. Neonatal outcomes of waterbirth: a systematic review and meta-analysis. *Archives Disease Childhood-Fetal Neonatal Ed*. 2016;101(4):F357–65.
 31. World Health Organization. Respectful Maternity Care: The Universal Rights of Childbearing Women. Geneva: WHO; 2011.
 32. Barry PL, McMahon LE, Banks RA, Fergus AM, Murphy DJ. Prospective cohort study of water immersion for labour and birth compared with standard care in an Irish maternity setting. *BMJ open*.

2020;10(12):e038080.

33. Henderson J, Burns EE, Regalia AL, Casarico G, Boulton MG, Smith LA. Labouring women who used a birthing pool in obstetric units in Italy: prospective observational study. *BMC Pregnancy Childbirth*. 2014;14(1):17.
34. COAG Health Council. *Woman-Centred Care: Strategic Directions for Australian Maternity Services*. Canberra: Department of Health; 2019.
35. Burns EE, Boulton MG, Cluett E, Cornelius VR, Smith LA. Characteristics, interventions, and outcomes of women who used a birthing pool: a prospective observational study. *Birth*. 2012;39(3):192–202.
36. Australian Institute of Health and Welfare (AIHW). *Australia's mothers and babies - Perineal status*. Canberra: AIHW. 2026. Available from: <https://www.aihw.gov.au/reports/mothers-babies/australias-mothers-babies/contents/labour-and-birth/perineal-status>
37. Sanders J, Barlow C, Brocklehurst P, Cannings-John R, Channon S, Gale C, et al. Establishing the safety of waterbirth for mothers and their babies: the POOL cohort study with nested qualitative component. *Health Technol Assess (Winchester Eng)*. 2026;30(15):1.
38. Cristina T, Mara T, Arianna S, Gennaro S, Rosaria C, Pantaleo G. Impact of waterbirth on post-partum hemorrhage, genital trauma, retained placenta and shoulder dystocia: A systematic review and meta-analysis. *Eur J Obstet Gynecol Reproductive Biology*. 2022;276:26–37.
39. Sanders J, Barlow C, Brocklehurst P, Cannings-John R, Channon S, Cutter J, et al. Maternal and neonatal outcomes among spontaneous vaginal births occurring in or out of water following intrapartum water immersion: The POOL cohort study. *BJOG: Int J Obstet Gynecol*. 2024;131(12):1650–9.
40. Sanders J, Barlow C, Brocklehurst P, Cannings-John R, Channon S, Cutter J, et al. Characteristics of women, intrapartum interventions, and maternal and neonatal outcomes among users of intrapartum water immersion: The UK POOL Cohort Study. *Birth*. 2026;53(1):55–66.
41. Milosevic S, Channon S, Hughes J, Hunter B, Nolan M, Milton R, et al. Factors influencing water immersion during labour: qualitative case studies of six maternity units in the United Kingdom. *BMC Pregnancy Childbirth*. 2020;20(1):719.