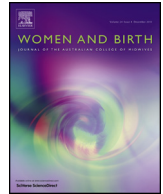




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# Australian women's perceptions and practice of sleep position in late pregnancy: An online survey

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### ABSTRACT

**Background:** Going-to-sleep in the supine position in later pregnancy ( $\geq 28$  weeks) has been identified as a risk factor for stillbirth. Internationally, public awareness campaigns have been undertaken encouraging women to sleep on their side during late pregnancy.

**Aim:** This study aimed to identify sleep practices, attitudes and knowledge in pregnant women, to inform an Australian safe sleeping campaign.

**Methods:** A web-based survey of pregnant women  $\geq 28$  weeks' gestation conducted from November 2017 to January 2018. The survey was adapted from international sleep surveys and disseminated via pregnancy websites and social media platforms.

**Findings:** Three hundred and fifty-two women participated. Five (1.6%) reported going to sleep in the supine position. Most (87.8%) had received information on the importance of side-sleeping in pregnancy. Information was received from a variety of sources including maternity care providers (186; 66.2%) and the internet (177; 63.0%). Women were more likely to report going to sleep on their side if they had received advice to do so (OR 2.3; 95% CI 1.0–5.1). Thirteen (10.8%) reported receiving unsafe advice, including changing their going-to-sleep position to the supine position.

**Discussion:** This indicates high level awareness and practice of safe late-pregnancy going-to-sleep position in participants. Opportunities remain for improvement in the information provided, and understanding needs of specific groups including Aboriginal and Torres Strait Islander women.

**Conclusion:** Findings suggest Australian women understand the importance of sleeping position in late pregnancy. Inconsistencies in information provided remain and may be addressed through public awareness campaigns targeting women and their care providers.

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### Statement of significance

#### Problem

Going to sleep in the supine position in late pregnancy has been identified as a risk factor for stillbirth.

### What is already known

Asking women to change from a back to a side sleeping position is a relatively easy behaviour change for women. International public awareness campaigns have found success in encouraging women to sleep on their side during late pregnancy.

### What this paper adds

This study was the first to look at sleep knowledge, practices and attitudes of Australian pregnant women. Participants knowledge of safe sleeping was high; however, improvements in information provided to women was evident.

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## 1. Introduction

Stillbirth is a major public health problem with a substantial mortality burden and psychosocial impact on parents, families and the wider community. With an estimated two million babies globally dying before birth every year, there is an increasing focus on this tragic pregnancy outcome [1]. Several factors have been identified that increase the risk of stillbirth; some well-known risk factors are potentially modifiable but can be difficult in terms of behavioural change, including maternal obesity and smoking [2]. Supine going-to-sleep position in late pregnancy (at or after 28 weeks' pregnancy) has emerged as an important modifiable risk factor for late-gestation stillbirth that is a relatively easy behaviour for women to change. This offers an opportunity to reduce stillbirth rates through education and awareness for women and their health care providers.

An individual participant data meta-analysis of maternal going-to-sleep position found a 2.63-fold increased risk of stillbirth in women who went to sleep in the supine position compared to women who went to sleep on their side [3]. Pregnant women generally spend the greatest amount of their sleeping time in the position in which they first settled to sleep [4]. Going to sleep in the supine position from 28 weeks of pregnancy is believed to reduce utero-placental blood flow to the fetus, due to the weight of the fetus and uterus restricting blood flow in the inferior vena cava and aorta, limiting oxygen flow to the placenta [5–7]. Maternal breathing disturbances may be exacerbated in the supine sleeping position, also potentially interrupting consistent oxygen flow to the woman and baby [8]. This disruption of blood flow may be harmful to babies who are already at higher risk of stillbirth [9,10].

A survey of maternal sleeping practices undertaken in New Zealand reported 87% of women in later pregnancy would be willing to change their going-to-sleep position if they knew it would benefit their baby, and that there would be little difficulty in making the change [11]. Asking women in late pregnancy to settle to sleep on their side is a simple, behaviour change that can be actioned by informing women of the benefits to their baby's health. Several successful international public awareness campaigns have been launched, including the 2017 Tommy's *Sleep on Side* campaign in the UK [12] and the 2018 New Zealand *Sleep on Side* campaign led by the University of Auckland, with funding from Cure Kids [13].

A national call for action to focus on education and awareness of stillbirth and risk factors aims to lower the rates of stillbirth by 30% by 2024 [14–16] through more attention to modifiable risk factors, including sleep position. Recent international studies indicate that women are willing to change their going-to-sleep position if recommended for their baby's health [17]. The purpose of this study was to identify current sleep practices, attitudes and knowledge of women in late pregnancy, to inform an Australian public awareness campaign including safe sleeping to reduce the risk of stillbirth.

## 2. Participants, ethics and methods

### 2.1. Study design

A cross sectional study of pregnant women ( $\geq 28$  weeks' gestation) living in Australia was conducted via an online survey using the software program Checkbox (Checkbox Survey, V.2017 Q2 SU2).

The primary outcome was the prevalence of supine sleeping for women in late pregnancy in the week prior to completing the survey. Secondary outcomes were: recall of sleeping advice received and the source of that advice; women's understanding of the importance of sleep position; women's recall of changing

going-to-sleep position; and perceived difficulty to change their sleep position.

### 2.2. Survey instrument

The survey included a total of 27 questions using multiple choice Likert scales and open-ended responses. The survey was modified from studies that investigated maternal late pregnancy sleep factors undertaken in the UK [18] and New Zealand [11,17] and pilot-tested by members of the Perinatal Society of Australia and New Zealand (PSANZ) Consumer Advisory Panel and the Stillbirth Foundation Australia. The survey was amended to ensure appropriateness for Australian women.

#### 2.2.1. Background characteristics of participants

Maternal demographics, pregnancy and prior pregnancy characteristics including; maternal age, Indigenous status, country of birth, postcode, primary language, education, employment and income status, gravidity, parity and prior pregnancy outcomes were collected. Demographic data were designed as per general Australian census items [19].

#### 2.2.2. Going-to-sleep position

To assess the primary outcome, women were asked what their usual going-to-sleep position had been during the week prior to survey completion. Responses were assessed categorically with options of 'Back', 'Tummy', 'Left side', 'Right side', 'Both left and right side', 'Sitting or propped up', 'Position varies (back, stomach, side)', and 'Don't know or don't remember'.

#### 2.2.3. Knowledge, practices, and attitudes about sleeping position

Additional questions were designed to elicit participants' knowledge, practices and attitudes regarding sleep position in late pregnancy. Participants were asked whether they had read or heard any advice about sleep position during pregnancy. Those who responded 'Yes' were asked additional questions, including 'Which advice have you read or heard about sleep position during your pregnancy from the list below?' 'What have you heard or read about the reason sleep position during pregnancy is important?', and free text responses. Participants were also asked what had been their most preferred (comfortable) sleep position during the week prior to completing the survey, and whether they had changed their usual going-to-sleep position because of advice or information received. If participants responded having changed their going-to-sleep position they were prompted to record their new position.

#### 2.2.4. Source of information regarding sleeping position

Participants were asked from where they had received advice or help about sleeping position during pregnancy. Participants could select as many options as applied from a prepared list, including various forms of print, digital, and social media, family and friends, the Internet, and different health care professionals. Participants were also asked to indicate the information source that they found most helpful regardless of accuracy.

### 2.3. Procedure

#### 2.3.1. Participants and recruitment

Pregnant women at 28 weeks' or more gestation, over the age of 16 years and who were living in Australia were eligible to participate. Participants were recruited through online pregnancy and support networks. Networks included Stillbirth Foundation Australia, Still Aware, Bears of Hope, the bub hub, Raising Children Network, Miracle Babies Foundation and Sands Australia. Networks disseminated the survey via their websites, online forums/

discussion boards, and via social media. Data were collected from November 17th 2017 to January 30th 2018.

Participants were provided information about the study prior to commencement and were notified that the survey would take no longer than 15 min to complete and that all responses would be anonymous. By accepting to undertake the survey, women were informed that they were providing consent for their data to be used. Women were asked their current gestation, age and country of residence within the first page of the survey to assess eligibility. Those who did not meet the inclusion criteria were thanked for their time and not able to proceed further with the survey. Women were provided with links to support services and prompted to seek medical advice if they were concerned or anxious about their baby or their health at any time while participating.

### 2.3.2. Sample size

Utilising methods similar to the survey for sleeping position undertaken in New Zealand [11] we aimed to receive at least 500 responses within a four-week period. With this sample size it was believed that a good representation of the Australian population would be achieved.

### 2.3.3. Analyses

Descriptive statistics were used to present maternal demographics, women's going-to-sleep position, knowledge of sleep position in late pregnancy and perceived difficulty in changing position. Exploratory analyses were undertaken to identify advice women had received in their current pregnancy, the source of information and women's understanding of the importance of sleep position in late pregnancy. Logistic regression was utilised to identify if advice received was independently associated with going-to-sleep in a side position. All analyses were completed using Stata V15 [20]. Significance was accepted at  $p < 0.05$  (two-sided).

### 2.4. Ethics statement

Ethical approval for this study was obtained by the subcommittee of the Mater Misericordiae Ltd.

Human Research Ethics Committee (EC00332) on 13th November 2017. The study fell within the guidelines for Low and Negligible Risk Research of the Australian National Statement on Ethical Conduct in Human Research.

## 3. Results

Over the survey period November 17th, 2017 to January 30th, 2018 a total of 352 women completed the survey. Of these, 8 [2%] women were excluded as they were not currently living in Australia at the time of participation, and a further 24 [7%] were excluded as they were <28 weeks' gestation. A total of 320 women were included in the final analysis.

### 3.1. Background characteristics of participants

The mean gestation of respondents was  $33 \pm 3.8$ SD weeks, 89 [27.8%] were nulliparous and 88 [27.5%] had experienced a previous miscarriage or perinatal death (stillbirth or neonatal death). Almost half of respondents (152 [47.5%]) were aged 30–34 years. The majority were Australian born (263 [82.2%]) and for 303 [94.7%] English was their first language. Four [1.5%] of the participants were Aboriginal and/or Torres Strait Islander women. Most women reported having tertiary education (226 [70.6%]) and being in active employment (fulltime/part time/casual work) at the time of participation (207 [64.7%]) (Table 1).

### 3.2. Going-to-sleep position

A total of 273 women [85.3%] reported settling to sleep in a side lying position in the week before completing the survey. A supine going-to-sleep position was reported by 5 [1.6%] participants. A further 22 [6.9%] reported going to sleep in a 'varied' position, including back sleeping (Table 2). Approximately 39 [12.2%] of women stated, regardless of the position reported, that they were more comfortable going to sleep on their back or in a varied position including their back.

### 3.3. Knowledge, practices, and attitudes about sleeping position

Most women, (281 [87.8%]) reported that they had received advice in their current pregnancy on sleeping position. Women reported receiving information from a variety of sources including maternity care provider (186 [66.2%]), the internet (177 [63.0%]), and family/friends (109 [38.8%]) (Fig. 1). Information that women received on sleep position varied. The most frequently received was to go-to-sleep in a non-supine position and to go-to-sleep on their left side (211 [75.1%]). Women reported accessing this side sleeping advice mainly from the internet (131 [46.6%]) and from their maternity care provider (110 [39.1%]). Several women reported receiving and accessing unsafe sleep advice including to go-to-sleep on your back ( $n = 5$ ) and not to worry about sleeping position ( $n = 16$ ).

Women reported that information from their maternity care provider was the most helpful source on sleeping position received pregnancy, (237 [84.3%]) (Fig. 2). The majority of women (251 [89.3%]) reported that sleeping position in late pregnancy was important as it could affect blood flow. Other reasons listed for importance included affecting the health of baby [65%] and maternal comfort [42%] (Fig. 3).

Women were significantly more likely to have reported going-to-sleep on their side in the past week (either left or right side and both sides) if they had received advice in their current pregnancy; OR 2.3; 95% CI 1.0–5.1.

**Table 1**  
Maternal characteristics (N = 320).

| Gestation in weeks                        | Mean (range)<br>33 (28–45)<br>N | SD<br>3.8<br>%    |
|---|---------------------------------|-------------------|
| Nulliparous                               | 89                              | 27.8              |
| Previous perinatal/pregnancy loss         | 88                              | 27.5              |
| Previous stillbirth                       | 12                              | 13.6 <sup>a</sup> |
| Previous neonatal death                   | 3                               | 3.4 <sup>a</sup>  |
| Previous early pregnancy loss             | 80                              | 90.9 <sup>a</sup> |
| Maternal age                              |                                 |                   |
| <24                                       | 8                               | 2.5               |
| 25–29                                     | 63                              | 19.7              |
| 30–34                                     | 152                             | 47.5              |
| 35–39                                     | 78                              | 24.4              |
| 40–44                                     | 19                              | 5.9               |
| Australian born                           | 263                             | 82.2              |
| Indigenous Australian                     | 4                               | 1.5               |
| English first language                    | 303                             | 94.7              |
| Education level                           |                                 |                   |
| Tertiary education                        | 226                             | 70.6              |
| Vocational education                      | 67                              | 20.9              |
| High school or other                      | 27                              | 8.4               |
| Employment status                         |                                 |                   |
| Fulltime/part time                        | 207                             | 64.7              |
| Stay at home parent                       | 45                              | 14.1              |
| Unpaid circumstances (Leave/student etc.) | 9                               | 2.8               |
| Paid Leave                                | 54                              | 16.9              |
| No job or benefit                         | 5                               | 4.6               |

<sup>a</sup> N = 88 women who reported a previous pregnancy loss.

**Table 2**  
Self-reported maternal going-to-sleep position in past week (N = 320).

|  | Position                              | Freq. (%)   |
|--|---------------------------------------|-------------|
| Going-to-sleep position                              | Both left and right                   | 170 (53.1%) |
|  | Left side                             | 78 (24.4%)  |
|  | Right Side                            | 25 (7.8%)   |
|  | Back                                  | 5 (1.6%)    |
|  | Position varies (back, stomach, side) | 22 (6.9%)   |
|  | Sitting or propped up                 | 8 (2.5%)    |
|  | Stomach                               | 12 (3.8%)   |
| Preferred going-to-sleep position (most comfortable) | Both left and right                   | 151 (47.2%) |
|  | Left side                             | 62 (19.4%)  |
|  | Right Side                            | 49 (15.3%)  |
|  | Back                                  | 21 (6.6%)   |
|  | Position varies (back, stomach, side) | 18 (5.6%)   |
|  | Sitting or propped up                 | 7 (2.2%)    |
|  | Stomach                               | 10 (3.1%)   |
|  | Unsure                                | 2 (0.6%)    |

### 3.4. Attitudes and practices in changing going-to-sleep position

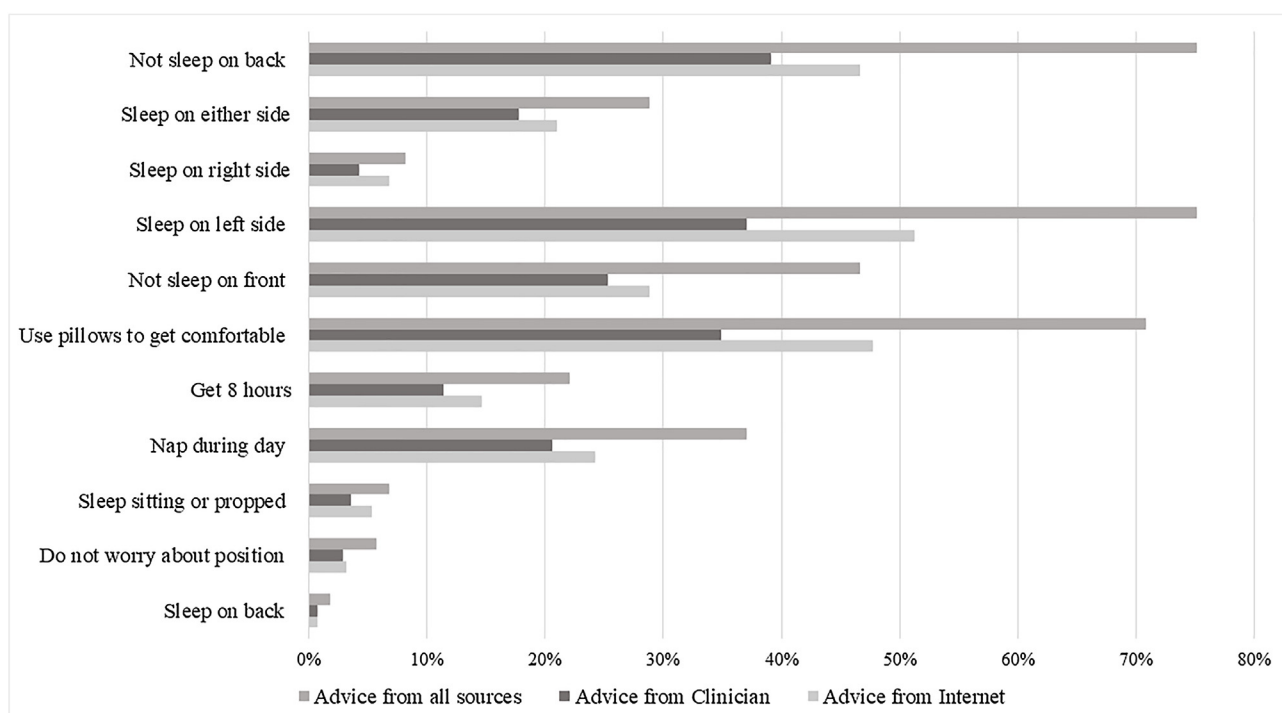
Over one third (n = 120) of women surveyed reported changing their going-to-sleep position based on advice that they received during their current pregnancy. Of the women reporting previously sleeping on their back (57 [47.5%]) the majority (n = 54) reported changing their going-to-sleep position from supine to a side lying position. In total, 13 [10.8%] women reported receiving unsafe going-to-sleep advice that was to change their going-to-sleep position from a side, front and “not sure” position to the supine position. Of the women who reported changing to a supine position, 9 [69.2%] women reported receiving the information from a maternity care provider.

Of the 120 women who reported changing their going-to-sleep position because of advice received, 96 [78.3%] reported that it was not difficult or only a little difficult to change. Women who had not changed position reported that they believed that it would not be difficult or only a little difficult to change position if they needed to (152 [77.2%]).

## 4. Discussion

Focussing attention on reducing modifiable risk factors, including supine sleeping in pregnancy, has potential to decrease the rate of late gestation stillbirths [21]. This study aimed to assess knowledge, attitudes and behaviours surrounding sleeping position in late pregnancy for pregnant Australian women. The low proportion of women settling to sleep on their back indicated that the women surveyed were generally well informed of the importance of side sleeping in late pregnancy. Most women identified that they had received information during pregnancy on safe sleeping position in pregnancy. Encouragingly, women were more than twice as likely to go to sleep in a side position if they had received advice on sleeping position in pregnancy. This indicates that women are already modifying their going-to-sleep position based on information and advice, although a small portion of women reported feeling more comfortable and would prefer to settle to sleep on their backs. These results are comparable with findings in New Zealand, finding women were more likely to change their going-to-sleep position if there were health benefits for their baby [11].

Stillbirth prevention requires a multi-pronged approach to address multiple elements of maternity care including sleep position advice for pregnant women [22]. Over three quarters of participants in the survey reported receiving information on sleeping position during their current pregnancy. The most common advice was to avoid settling to sleep on their back, and to sleep on their side. Women reported receiving this information more frequently from their maternity care provider or the internet



\*Women could select more than one option for all categories

**Fig. 1.** Advice women received about sleeping position in late pregnancy by source of information.

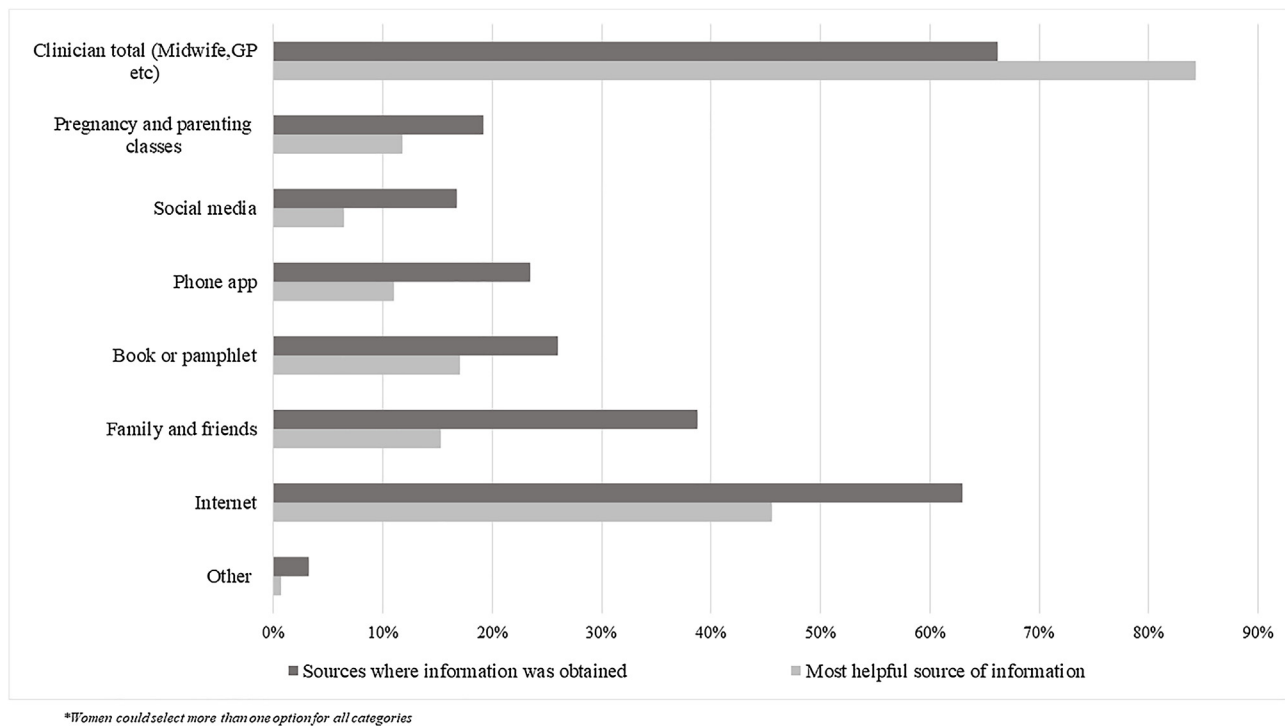


Fig. 2. Source of information identified by women.

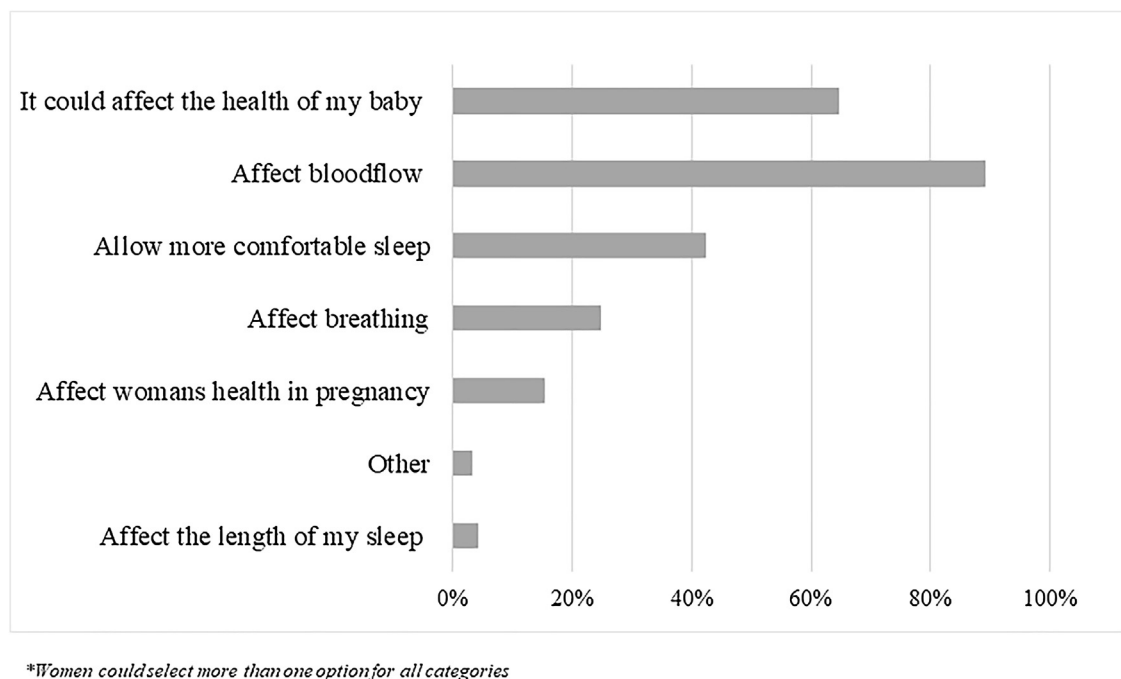


Fig. 3. Most helpful information by source identified by women.

than from any other sources. Reassuringly, these data indicate that Australian maternity care providers are providing evidence-based information to women and encouraging side sleeping in late pregnancy.

The most common sources of information women accessed were from their maternity care provider (66%) and the internet (63%). These results are consistent with the results of the UK MiNESS study which found that 56% of women accessed the internet for their information [18]. That study suggested that campaigns targeting

women should include internet strategies as well as health care professionals [18]. The current survey showed women who received information about sleeping position in pregnancy from their maternity care provider were more likely to change their going-to-sleep position. Women further reported that the most accessed source of information was their maternity care provider. This finding demonstrates the importance of health care providers' role in providing adequate side sleeping information, as women are more likely to heed the message and change their behaviour. Whilst almost

all women reported changing their going-to-sleep position from a supine to a side position based on advice received, a small number reported changing their going-to-sleep position to supine sleeping. This potentially reflects ineffective or unclear messaging, and/or inconsistencies in the information being provided, and emphasises the need for tailored, evidence-based information that meets the needs of women and their care providers.

Most women (78%) who reported changing their going-to-sleep position indicated that it was not difficult or only a little difficult to do so. This is consistent with the results from New Zealand, which found 87% of participants would be willing to change their going-to-sleep position for the health of their baby [17], and demonstrates women's desire to modify behaviour if they are properly informed of the health benefits for their baby.

#### 4.1. Strengths and limitations

This is the first study in Australia to survey women's sleeping position knowledge and practices in late pregnancy. The survey was conducted prior to the release of any formal, national or any international public awareness campaigns focused on sleep position, ensuring a baseline dataset uninfluenced by campaign material.

Several limitations to this study may be attributed in part to the recruitment methods. It is unknown how many prospective participants potentially received information from disseminating organisations about the survey, and therefore the denominator and response rate could not be calculated. The sample generalisability to the wider Australian population was diminished given few responses from Indigenous women (1.5%) compared to the national average of birthing women in Australia who are Indigenous (4.5%) [23]. Other groups such as South Asian and African women were also underrepresented [21]. Participants with tertiary education were over-represented compared with the national average [19], and finally women who had experienced a previous perinatal loss were also over-represented. This was most likely due to the recruitment methods adopted, as many of the disseminating organisations were involved in support and/or advocacy around perinatal loss. It is therefore likely that this data may have overestimated women's knowledge of safe sleeping practices, given the higher-risk status of the sample of women.

Although the current study did not meet the expected sample size, it is comparable to surveys conducted in New Zealand, which were invaluable in influencing New Zealand public awareness campaigns [11]. Further research should be undertaken to gain a more comprehensive understanding of late pregnancy sleep practices among all Australian pregnant women. Particular focus should be on women at increased risk of stillbirth where the benefit of changing going-to-sleep position may be greater; as such, there is a need for co-design of culturally and linguistically appropriate information. This work is currently underway as part of the NHMRC Centre of Research Excellence in Stillbirth's Safer Baby Bundle (SBB) program [15,22].

It is important that any public awareness campaign around stillbirth prevention is designed with care and sensitivity, including attention to unintended consequences, particularly when the campaign deals with modifiable risk factors [16], such as maternal going-to-sleep position. It has been suggested [9,20] that women may become anxious that they are harming their baby if they wake on their back [9,24]. Public messages provided to women need to emphasise the going-to-sleep position as the target of behaviour change, and to advise women should not to be concerned if they wake up and need to adjust their position during episodes of sleep. Resources of the SBB have been developed for women with this advice, explaining that women spend the greatest proportion of their time asleep in the position in which they first settled [15].

## 5. Conclusions

This survey suggests that a high proportion of women in Australia who undertook this survey understand the importance of going to sleep on their side in late pregnancy and are practising safe sleeping recommendations. However, it is evident that there are opportunities for improvement in the information and advice provided, as some women reported changing to a supine going-to-sleep position based on advice. A National Stillbirth Public Awareness Campaign has been recently funded by the Australian Government Department of Health "Stillbirth Education and Awareness Grant Opportunity (GO2536) awarded to RedNose Australia in collaboration with planned evaluation by the Stillbirth CRE. The campaign has been designed to enhance the evidence based messaging within the National SBB program and will run in 2021. A well-designed, national evidence-based education initiative and accompanying awareness campaigns targeting women and their health care providers may address the potential inconsistencies in information provided to women. Such a campaign must be informed by further research to understand the needs of all Australian women, particularly those at increased risk of stillbirth such as Indigenous and migrant and refugee women [23,25,26]. The results of this survey shed valuable light on how Australian women perceive and act on the importance of sleeping position in late pregnancy, to inform future Australian public awareness campaigns.

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## Conflict of interest

None declared.

## Ethical statement

This study was approved by the subcommittee of the Mater Misericordiae Ltd. Human Research Ethics Committee (MML HREC) (EC00332) on 13th November 2017 (Reference No: HREC/17/MHS/123), within the guidelines for Low and Negligible Risk Research of the Australian National Statement on Ethical Conduct in Human Research (2007) updated 2015.

## Authors' contributions

VF and AG conceived the study and developed the survey based off case studies and surveys completed in the UK and New Zealand. DE provided input and advice into the protocol and methods. RC provided valuable insight into comparisons with similar surveys undertaken in New Zealand. AW and KW assisted in the creation of the online survey and organised dissemination through organisations. PM provided advice on the survey for Indigenous women. FB contributed to survey development and designed the qualitative assessment aspect of the survey. KW completed analyses with CA and VF and led the drafting of the manuscript. All authors commented and provided valuable feedback on the manuscript.

## Availability of data and materials

The datasets for the current study are not publicly available due to the guidelines of institutional ethical review but are available from the corresponding author on reasonable request.

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