Knowledge, attitudes and behaviours surrounding preconception and pregnancy health: an Australian cross-sectional survey

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ABSTRACT

Objective To understand Australian women’s knowledge, attitudes and behaviours surrounding preconception and pregnancy health and their preferences for information about these periods.

Design Cross-sectional survey.

Setting Making healthy changes can optimise preconception and pregnancy outcomes. Clinical practice guidelines inform preconception and pregnancy care in Australia. Women often have access to multiple sources of information on reproductive and pregnancy health.

Participants Women of reproductive age were asked to complete a web-based survey. The survey development was informed by preconception guidelines, consensus statements and the national pregnancy care guidelines. The survey was distributed through social media, local and national networks from 2017 to 2018.

Results Completed surveys were received from 553 women. The majority (80.4%) had high educational attainment. Checking immunisation status and ensuring good mental health were rated as equally important actions both preconception (65%) and during pregnancy (78%). Limiting sedentary activities was not rated as an important action to take either preconception (36%), or during pregnancy (38%). Although women have good knowledge about the impact of weight on their own health outcomes (eg, gestational diabetes), there was less knowledge about adverse outcomes for babies like stillbirth and preterm birth. Women access many sources for reproductive health information, however, the most trusted source was from healthcare professionals.

Conclusion Most women of reproductive age in Australia have knowledge of the key health recommendations for preconception and pregnancy. However, there are gaps related to lifestyle behaviours particularly connected to weight gain and outcomes for babies. There is a strong preference to receive trusted information from healthcare providers through multiple resources.

BACKGROUND

Planning for pregnancy and pregnancy are unique windows of opportunity when women are often motivated to optimise health and change their lifestyle.1–3 Positive changes have the potential to impact the woman’s health as well as the health of the next generation.4 Positive behaviour modifications to nutrition, physical activity and the cessation of smoking, drug and alcohol use are important actions both preconception (65%) and during pregnancy (78%). Limiting sedentary activities was not rated as an important action to take either preconception (36%), or during pregnancy (38%). Although women have good knowledge about the impact of weight on their own health outcomes (eg, gestational diabetes), there was less knowledge about adverse outcomes for babies like stillbirth and preterm birth. Women access many sources for reproductive health information, however, the most trusted source was from healthcare professionals.5–7 Managing excess weight and preventing obesity in the reproductive years can improve women’s chronic disease trajectories and have intergenerational health benefits.5–8–10 Commencing folic acid supplementation, managing pre-existing medical conditions and considering genetic history are also key components of preconception care.11 A recent umbrella review of systematic reviews by Daly et al12 of preconception exposures and adverse pregnancy, birth and postpartum outcomes, found the quality of studies was largely low. However, high-certainty evidence for maternal folate supplementation for reducing neural tube defects and moderate-certainty evidence for maternal physical activity to reduce the risk of pre-eclampsia, and gestational diabetes was found. Furthermore, moderate-certainty evidence was also uncovered for the association between maternal body mass index (BMI) and interpregnancy weight gain on adverse pregnancy and birth outcomes.12

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study was developed using scales, validated tools and open-text responses that allowed for in-depth data analysis of women’s actions related to seeking information and care.
⇒ Survey questions were based on Australian preconception and pregnancy guidelines.
⇒ This study is not representative of all women of reproductive age as participants were women who have a high baseline education, income, social support and self-esteem.
⇒ This study was conducted prior to the COVID-19 pandemic, prior to dependence on technology to deliver care.
The Australian pregnancy care guidelines provide high-quality evidence-based guidance for maternity care providers. These guidelines recommend early engagement with maternity care providers and a range of actions including screening for infection, recommending relevant immunisations and monitoring for, and managing pregnancy-related complications. Furthermore, these guidelines recommended that women be advised about appropriate gestational weight gain based on the US Institute of Medicine and Australian dietary and physical activity guidelines. Gestational weight gain above or less than these recommendations is associated with a higher risk of adverse outcomes for the mother and infant.

Despite increasing evidence about the benefits of preconception care for those who have unintended pregnancies the opportunity for preconception healthcare is often missed. An Australian national survey conducted by Rowe et al found that 40.8% of first pregnancies are unintended for those aged 18–32 years. Furthermore, authors found that women who have an unintended pregnancy were more likely to have socioeconomic disadvantage, live in a rural setting and have experienced sexual coercion. A study conducted in 2021 found that married women who were planning pregnancy had two or less children and were privately insured, and were more likely to follow preconception recommendations. Furthermore, one-third (n=50/187) of women continued smoking, 64.4% (n=139/216) continued to drink ≥1 standard alcoholic drink per week and five (9.6% of the 52 women who reported ever using illicit drugs) women continued to use illicit drugs 3 months preconception. Alcohol and smoking rates were concerning in both those planning and not planning pregnancy and young women were more likely to smoke in the preconception period and not take folic acid.

Health information is rapidly changing and complex. Using technology to search for reproductive health and pregnancy information is common, understanding how women access information, the barriers and facilitator’s, can help those designing interventions to create the most effective and acceptable resources. A qualitative investigation by Khan et al found that Australian women prefer online platforms to access information, however, they felt that such platforms should be endorsed by government or professional bodies to increase trust in these resources. Women also stated that if they had difficulties in accessing reliable online information this can lead to anxiety and stress. This study also found that although women know about healthy lifestyle behaviours before pregnancy, they do not necessarily engage in formal preconception appointments or screening. In the study by Lang et al young women were reported to be less likely to access information from healthcare professionals.

Currently there are a lack of high-quality preconception care guidelines and therefore healthcare professionals do not have the resources to offer comprehensive preconception care supported by high-quality evidence.

To increase guideline relevance and acceptability in clinical practice, and develop guidelines that respond to clinical need, input from end-users, those of reproductive age, is essential. In the case of preconception and pregnancy guidelines, understanding the awareness, opinions, actions and preferences of women towards preconception and pregnancy information may assist with developing guidelines that can then be tailored to an individual’s physical and mental health conditions, health behaviours, and social context.

This study aimed to investigate women’s knowledge, attitudes and behaviours surrounding preconception and pregnancy health and their preferences for the provision of this information.

METHODS

Survey design and participants

A web-based cross-sectional survey was designed to assess Australian women’s knowledge, attitudes and behaviours related to preconception and pregnancy health (online supplemental file 1). The survey took 15–20 mins to complete and explored sociodemographic details, women’s knowledge, attitudes, behaviours and preference for information delivery using open and closed questions.

The study was undertaken to inform the development of a metropolitan local healthcare service for preconception health. A bespoke survey was informed and designed by conducting a literature review and using preconception guidelines, consensus statements and the national pregnancy care guidelines (2018) used in practice; at the time of study design development there were no systematic reviews on preconception care available. Questions were based on recommendations mentioned in any of the three available preconception care guidelines used in primary healthcare at the time of developing the survey. Content validity was assessed in consultation with a multidisciplinary health team within Sydney Local Health District (SLHD), this consisted of expertise across obstetrics, midwifery, neonatology, public health, dietetics and endocrinology. Face validity was established by piloting the survey with women of reproductive age within the SLHD and seeking feedback about comprehension and formatting.

The survey was open from June 2017 to February 2018 and Australian women and men of reproductive age, over 18 years, were invited to participate, with no exclusion depending on pregnancy status. Participants were excluded if they did not have access to a digital device to complete the survey or if they were unable to read English. No prespecified target sample size was available for this population, therefore, we used non-probability sampling with the intention to collect data to inform the development of local care pathways. To reduce sampling bias, invitations were distributed through multiple local health area social media platforms (eg, Inner West Mums, Sydney Local Health District Facebook, and Twitter) and relevant local websites (eg, Little Wonder, Central,
and Eastern Sydney Primary Health Network, Sydney University). There was additional distribution through professional national networks (known to the authors) including the Perinatal Society of Australia and New Zealand, the Centre of Research Excellence in Stillbirth (Stillbirth CRE) and the Australian College of Neonatal Nurses. The survey was conducted online, administered anonymously and participation was voluntary. The first page of the survey contained a participant information explaining the purpose of the study and defined/explained terminology such as ‘preconception’ in non-medical language. This page also informed participants that by completing and submitting the survey they were giving consent to participate, this was approved by the Ethics Review Committee (RPAH Zone) of the SLHD (ref: X15-0325).

Sociodemographic information collected was based on the Australian Bureau of Statistics27 data collection tool and included age, education, employment status and income. Questions related to health and well-being, medical conditions, current medications, BMI and pregnancy status. Validated tools were used to collect data related to self-esteem (Rosenberg’s self-esteem scale) and social support (Multidimensional Scale of Perceived Social Support)28 to assess how this may have affected knowledge and behaviours.

The survey was divided into four sections: (1) knowledge about preconception and pregnancy health, (2) attitudes towards preconception and pregnancy health (including pregnancy planning), (3) behaviour changes before pregnancy and (4) preferences for the provision and sources of information. Knowledge questions related to seeing a healthcare professional, diet, supplementation, healthy lifestyle habits and the impact of maternal weight before or during pregnancy on outcomes for mother and baby. The outcomes measured were informed by the Lancet preconception series3 and the Australian pregnancy care guidelines.26 Women with a BMI of >25 kg/m² or 25 kg/m² and over. Independent proportions were compared using the Pearson χ² test or Fisher’s exact test. Where free text data were entered it was analysed and grouped by theme. Statistical analysis was performed using IBM SPSS V.24 (IBM Corp, Armonk, New York, USA).

Patient and public involvement
The study did not involve women receiving maternity care. Study findings are being made publicly available to participants and the general public through the production of open access journal articles. The study web-based survey consent form provided contact details for the research team if any individual wished to directly request publications.

RESULTS
Socio-demographic data
In total, 680 survey responses were received. One hundred and twenty-five were excluded: 94 (13%) for discontinuing the survey or not answering key knowledge questions, and 31 (4%) responses from men were excluded as only 19 completed the survey. The final analysis included 553 women and the completion rate was 81%. Participants had normal (78.8%) to high (16.5%) self-esteem as measured by the Rosenberg’s self-esteem scale29 and high social support (85%) as measured by the Multidimensional Scale of Perceived Social Support.28 Demographic details are shown in table 1.

Knowledge about preconception and pregnancy health
Participants rated the importance of all preconception and pregnancy health actions presented. Women considered that ensuring good mental health and having up-to-date vaccinations were the most important actions to take regarding seeing a health professional when planning pregnancy (65%) and when pregnant (78%). Prior to pregnancy, eating a healthy diet was considered the most important action (78%), whereas during pregnancy, avoiding alcohol (84%) was thought to be the most important. Minimising exposure to toxins and radiation was regarded as most important when planning for pregnancy (67%), whereas in pregnancy, the majority of women felt that avoiding using illegal drugs was a priority (87%). Importance ratings for preconception and pregnancy health actions are shown in figures 1 and 2.

Women’s knowledge of the relationship between weight for maternal outcomes such as diabetes and hypertension in pregnancy was high regardless of BMI (74%–75% and 70%–71%, respectively). However, knowledge of outcomes for babies, such as stillbirth (29%–37%; p=0.062) and preterm birth (33%–44%; p 0.007), was significantly less (online supplemental file 2).

Attitudes towards preconception and pregnancy health
Women who were not pregnant (or those who were unsure but trying to conceive) (n=443) were asked how long they would wait until they would try to conceive, 11% were currently trying to conceive and 12% were...
planning a pregnancy in the next 6–12 months. Of these women, 32% had discussed planning for a family with their partner and 27% had consulted with a healthcare professional about these plans.

Women with a self-reported BMI >25 kg/m² (n=279) were asked if they would consider participating in a weight loss programme before pregnancy, and if so, what sort of programme and how long for. Almost half (48%) responded that they would consider participating in a weight loss programme before pregnancy. Of these women, 42% preferred an online weight loss and lifestyle programme, 29% selected the same programme additional dietitian support. A total meal replacement programme via a weight management service (hospital-supported or general practitioner (GP)) was the least preferred option (4%). Forty-eight per cent stated they would follow a programme for 8–12 weeks, over a third of women would prefer to follow a 12-week programme (37%).

**Behaviour change before and during pregnancy**

Women were asked about lifestyle or health changes made in previous pregnancies or in the current pregnancy. Before pregnancy, 68% of women had taken two or more actions to improve their health, 14% had taken one action and 18% had taken no actions. Actions taken included folic acid supplementation and reducing, or eliminating alcohol consumption. Most women thought that making healthy changes before pregnancy was ‘very important’ or ‘important’ (94%) and most found making these health changes ‘very easy’ or ‘easy’ (69%).
Preferences for provision of information used and preferred

Women access a variety of information, the ways they do this differ according to pregnancy status (table 2), however, they preferred to get preconception and pregnancy advice from healthcare practitioners (69% and 76%, respectively). In terms of women’s request for new resources, a checklist was identified as the most useful both preconception and in pregnancy (23%).

DISCUSSION

Results from our web-based survey revealed that women of reproductive age seek information about preconception and pregnancy health from several different sources, however prefer to get this information from healthcare professionals. Women’s knowledge about actions related to preconception and pregnancy testing and dietary recommendations was generally good, however, knowledge was limited about lifestyle recommendations and the impact of weight on preconception and pregnancy outcomes.

Half of the women who responded to our survey had a BMI >25 kg/m². Our findings suggest that for women with higher BMI there is less knowledge about significant, but less common, outcomes associated with high BMI like stillbirth and preterm birth. Our findings support the work of Cha et al.,30 Shube et al.31 and Cheney et al.32 that show that women may be unaware of the risks related to being overweight or obese before or during pregnancy. Our study adds to evidence that supports preconception counselling for all women of reproductive age and particularly for women with high BMI. Our study also confirms previous research that suggests that women are receptive to using technology to access health information, however, consulting with a healthcare professional is preferred over other sources.33 34

Public healthcare messaging using technology that is driven by healthcare professionals may promote positive lifestyle behaviour changes, such as weight management.35 Using technologies such as social media and health apps that target those in their reproductive years may be one way to increase awareness of preconception health and encourage conversations with those who provide preconception counselling.36 In Australia there are limited comprehensive preconception care services that are hospital based, therefore primary healthcare, including preconception care, is delivered by GPs. A study by Kizirian et al.22 found that 50% of GPs were aware of current preconception care guidelines and most do

Figure 1  Rating of importance of preconception advice. Women rated statements as either ‘Important to me’, ‘Somewhat important to me’ or ‘Not important to me’ (n=443). GP, general practitioner. STI, sexually transmitted infection.
not recognise overweight to be a significant preconception issue. This study identified that the most common barriers to preconception care delivery by GPs were time constraints, lack of knowledge and lack of resources for patients.22 To address these barriers and raise public awareness about preconception health, primary healthcare education for healthcare professionals should be embedded in all healthcare curricula and offered as a clinical experience so that healthcare professionals have the skills and knowledge to provide healthy lifestyle interventions to all people across their reproductive years.37 Furthermore, by valuing and upskilling all healthcare professionals knowledge and education of preconception evidence-based care, this potentially will support them to initiate opportunistic conversations about reproductive health.38 However, high-quality primary healthcare preconception counselling alone will not change an individual’s behaviour; psychosocial factors such as self-esteem and the wider sociopolitical context such as social support are also important in positive behaviour change.39

Our findings suggest that web-based resources are acceptable to women of reproductive age. Using this technology could be used to address barriers to care delivery such as GP time constraints and provision of evidence-based resources.

Our study has several strengths, it was developed using scales, validated tools and open text fields were used so that we could explore other actions related to seeking information and care. Furthermore, questions were based on the most used and recent Australian preconception and pregnancy guidelines and the evidence about the impact of weight on maternal and neonatal outcomes. The survey was reviewed and tested by healthcare professionals and women living within the health district and distributed online using known networks.

Our study was designed to inform care pathways and planning for women attending maternity and reproductive services in a metropolitan local health district in Sydney, New South Wales, this design has presented some limitations and impacted on generalisability of findings. Using an online sample creates a greater potential for sampling and selection bias. Our intention was to reach a diverse number of participants; however, this method can also be problematic as participants may share the survey only with other like-minded individuals who may have shared characteristics, this may lead to selection bias. A further limitation was that the responses were self-reported, and so potentially participants may have accessed materials to inform their responses, particularly since the survey was conducted online with easy access to resources. Ideally outsourcing the distribution of the survey to a polling company may have reduced sampling and selection bias, however, we did not have funding to support this. Our questionnaire also named potential

Figure 2  Rating of importance of pregnancy advice. Women rated statements as either ‘Important to me’, ‘Somewhat important to me’, ‘Not important to me’ or ‘Not relevant to me’ (n=110). GP, General practitioner. HCP, Health care practitioner.
Table 2  Source of preconception and pregnancy information

<table>
<thead>
<tr>
<th>Source of information or resource</th>
<th>Used, n (%)</th>
<th>Pregnancy, n=110</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV programme</td>
<td>Preconception, n=553</td>
<td></td>
</tr>
<tr>
<td></td>
<td>110 (10)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Radio</td>
<td>33 (3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Newspaper</td>
<td>39 (3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Magazine</td>
<td>99 (9)</td>
<td>16 (5)</td>
</tr>
<tr>
<td>Mobile phone app</td>
<td>29 (3)</td>
<td>49 (15)</td>
</tr>
<tr>
<td>Social media or online support</td>
<td>113 (10)</td>
<td>30 (9)</td>
</tr>
<tr>
<td>Blog</td>
<td>31 (3)</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Internet</td>
<td>133 (12)</td>
<td>79 (24)</td>
</tr>
<tr>
<td>Email</td>
<td>14 (1)</td>
<td>8 (2)</td>
</tr>
<tr>
<td>Healthcare provider</td>
<td>238 (21)</td>
<td>78 (23)</td>
</tr>
<tr>
<td>Family and/or friends</td>
<td>170 (15)</td>
<td>54 (16)</td>
</tr>
<tr>
<td>Nothing</td>
<td>114 (10)</td>
<td>3 (1)</td>
</tr>
</tbody>
</table>

Table 2 represents the frequency of each option. All women (n=553) were asked to respond to the preconception questions regardless of pregnancy status. Pregnancy questions were only answered by those currently pregnant (n=110). The percentage (%) is based on the number of total selections made, women were asked to select nil or any/all that applied, therefore the percentages add to over 100%.

risk factors and this potentially impacted our findings of knowledge as the mention of these may have prompted participants’ responses.

Most participants were born in Australia (76%), well educated, high-income earners and have high social support and self-esteem, therefore our results do not necessarily reflect the knowledge, attitudes and behaviours of culturally and linguistically diverse communities, marginalised women or those who are most at risk of poor pregnancy outcomes.40–41 However, our findings are interesting as they represent women who might be expected to have excellent understanding yet still had knowledge gaps. This highlights the need to develop interventions for all women of reproductive age and not just target those women perceived to be more at risk.

At the time the survey was developed and conducted there were few preconception guidelines, this is still the case today. A further potential limitation is that the survey was conducted in 2017–2018, therefore, it reflects women’s preferences for healthcare delivery before the COVID-19 pandemic. Since the pandemic, maternity health services have had to adapt and change to use technology. Bradford et al found that a higher than expected proportion of women were satisfied with the quality of care they received during the COVID-19 pandemic, despite less access to healthcare professionals and this may reflect better access through online or telehealth services.43 Although women may prefer to receive information from healthcare professionals, how this information is delivered depends on the resources available at the time, using technology appears to be acceptable to women.

Our results highlight several research gaps and opportunities to improve preconception and pregnancy health. Women want to receive health information from healthcare professionals both preconception and in pregnancy (n=238, 21% and n=78, 23%, respectively), however, they are also sourcing information from the internet and mobile phones (preconception n=133, 12%, and pregnancy n=79, 24%). Further research is need to explore how web-based interventions can be used to support preconception and pregnancy healthcare and reach those who may not even be planning pregnancy yet. Ideally these interventions should be codesigned by healthcare professionals and end-users as this would increase uptake and improve acceptability. Due to the success of mobile health during the COVID-19 pandemic, further uses should be explored, including how applications can be tailored to meet the needs of women from culturally diverse backgrounds. Research in this area is limited, however, given the impact that evidence-based preconception and pregnancy care can have on outcomes, exploring how to deliver this in a large randomised controlled trial is warranted. Until high-quality evidence is available it is unlikely that interventions, such as mobile phone apps, will be accepted as an adjunct to care by healthcare professionals. Furthermore, the development of a national guideline on preconception health is needed to develop these interventions, and also assist particularly GPs to do this primary healthcare work. Finally, there are many opportunities to delivery reproductive health across the lifespan, such as school education and health checks, these opportunities need to be explored further so that appropriate training can take place for those in a position to deliver it and appropriate resources developed for the target cohort.

Conclusion

Most women of reproductive age in Australia have knowledge of the key health recommendations for preconception and pregnancy. However, there are gaps related to lifestyle behaviours particularly connected to weight gain and outcomes for babies. There is a strong preference to receive trusted information from healthcare providers through multiple resources; it is important for these resources to be co-designed with clinicians and women.

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Contributors LMM and AG contributed to the design of the study as well as the distribution of the survey and writing of the manuscript. LM led the analysis of the survey data, drafting and designing the tables, figures and appendixes and wrote the first draft. LMM, CH and AG contributed to drafts and revising of the paper and all approved the final version. LMM accepts full responsibility for the finished work, had access to the data, and controlled the decision to publish.
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Patient consent for publication. Not applicable.

Ethics approval. This study involves human participants and was approved by Ethics Review Committee (RPH1 Zone) of the Sydney Local Health District (SLHD) (ref: X15-0325).

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