






Setting Preconception Care Priorities in Australia Using a Delphi Technique

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Abstract

Preconception health affects fertility, pregnancy, and future health outcomes but public awareness of this is low. Our aims were to rank priorities for preconception care (PCC), develop strategies to address these priorities, and establish values to guide future work in preconception healthcare in Australia. A Delphi technique involved two rounds of online voting and mid-round workshops. Inputs were a scoping review of PCC guidelines, a priority setting framework and existing networks that focus on health. During July and August, 2021, 23 multidisciplinary experts in PCC or social care, including a consumer advocate, completed the Delphi technique. Ten priority areas were identified, with health behaviors, medical history, weight, and reproductive health ranked most highly. Six strategies were identified. Underpinning values encompassed engagement with stakeholders, a life course view of preconception health, an integrated multi-sectorial approach and a need for large scale collaboration to implement interventions that deliver impact across health care, social care, policy and population health. Priority populations were considered within the social determinants of health. Health behaviors, medical history, weight, and reproductive health were ranked highly as PCC priorities. Key strategies to address priorities should be implemented with consideration of values that improve the preconception health of all Australians.

Keywords

- ▶ preconception care
- ▶ primary care
- ▶ health care
- ▶ consensus

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Background

Preconception Health

Preconception health impacts fertility,^{1,2} pregnancy outcomes,³ infant health^{4,5} and the future health and wellbeing of parents and their children.^{1,2,5,6} Preconception health traditionally refers to the critical weeks before conception and the period when someone is actively planning to become pregnant.^{7,8} A life course view of preconception health includes the years and even decades before a pregnancy, when wellbeing and health behaviors have the potential to impact on pregnancy outcomes.⁷ Preconception health is adversely impacted by a plethora of non-modifiable and modifiable risks. Non-modifiable risks include, but are not limited to, genetics, age, and pre-existing health conditions such as type 1 diabetes and endometriosis.^{9–11} Modifiable risks are often related to health behaviors such as poor diet, substance use and exposure to toxins.¹² Evidence suggests many people are unaware of the degree to which their preconception health can affect fertility, pregnancy, and future health outcomes.¹¹ Preconception health is relevant to all people because of its positive impact on an individual's short- and long-term health regardless of pregnancies.

Preconception Care (PCC)

Preconception care (PCC) is the provision of biomedical, behavioral and social health interventions to optimize the preconception health of potential parents.^{13,14} The scope of PCC is broad, with the Centers for Disease Control Work Group on Preconception Health and Health Care reviewing over 80 potential components.¹⁵ Traditionally, there has been a highly gendered approach to interventions that increase awareness of preconception health and PCC, with most interventions targeting women,¹⁶ rather than being inclusive of all people, all genders and all sexual orientations. Among all people, community awareness of PCC is low^{17,18} and many people only seek PCC if they experience difficulties when trying to become pregnant.¹⁹ Regardless of whether health risks are modifiable or not, PCC may help to mitigate many of the risks related to preconception health. Importantly, PCC should be accessible to all and provided with consideration of the social and economic determinants of health, including education, access to health care and employment that impact on health and health behaviors, particularly for priority populations.²⁰

Where does PCC Fit in the Australian Health System?

Primary care is viewed as a person's or couple's first point of contact with PCC.^{13,17} Primary care is delivered by a range of health professionals including doctors, nurses, midwives, pharmacists and allied health professionals. The Royal Australian College of General Practitioners' guidance for PCC provides general recommendations¹³ and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists have a statement (currently under review) with four consensus-based recommendations to guide health professionals as they counsel women prior to pregnancy²¹; however, no national and cross-sectorial PCC recommendations

exist in Australia. Interestingly, there is no Medicare Benefits Schedule item number (healthcare funding scheme in Australia) to bill PCC appointments in primary care²² which would take longer than a routine primary care visit. Health professionals in Australia have reported both the lack of guidelines and financial incentives as barriers to the provision of PCC.^{23,24}

Access to PCC is important in other settings including tertiary health care, social care and education settings, particularly those serving priority populations. Rates of preconception health risks such as sexually transmitted infections (STIs), family violence and suboptimal nutrition tend to be higher in groups that experience health inequity and/or encounter barriers to accessing health care such as geographical isolation and racism.^{25–27} Therefore, other sectors such as social care and education have a crucial role in increasing people's access to preconception health knowledge and support. These sectors have been recognized internationally as universal opportunities to implement PCC.²⁸ Currently there is minimal integration of PCC services across these sectors in Australia.

The Preconception Health Network (the Network) was established in 2021 through collaboration between the National Health and Medical Research Council Centre of Research Excellence Health in Preconception and Pregnancy, Monash University and the University of Sydney. The Network is building a national cross-sectorial network that aims to promote best practice in preconception health promotion and care and empowers people to optimize their reproductive health and wellbeing across the life course. Objectives of the Network include to i) identify and prioritize gaps in preconception health promotion, PCC and research, ii) foster collaboration across health care, iii) foster collaboration across sectors, iv) advocate for systems and legislation that promote preconception health, and v) promote research translation and the development of evidence-based resources. Initial Network discussions focused on selecting and planning initiatives to achieve its objectives. The Network agreed that future work should target areas where the most significant gains in preconception health could be achieved.

One of the Network's first tasks was to undertake priority setting for PCC in Australia. This research documents how the Network: i) identified and ranked priorities for PCC, ii) developed key strategies for addressing the priorities; and iii) established a set of underpinning values to guide future work undertaken in preconception health in Australia. This priority setting will guide the future activities of the Network and provide all sectors involved in preconception health promotion, including research, health care, education, social care, and government, with a clearer picture of what is required to make significant gains in preconception health for the general population and priority groups.

Methods

The Network used a Delphi technique to achieve the study aims. A Delphi technique is a process of gathering expert opinion to arrive at a consensus.²⁹ This process has been

applied in health care in a range of ways, including to prioritize lifestyle and medical factors for the achievement of optimal weight management for preconception³⁰ and pregnancy.³¹ A Delphi technique may take many forms but a key feature is that it involves rounds of opinion sharing, reflection and reconsideration of opinion until a consensus is reached.^{29,32} Our Delphi technique involved two rounds of online voting and mid-round online workshops involving participants with expertise in the field of preconception health and a consumer advocate (recruited via a women's health organization). Ethics approval was granted by Monash Human Research Ethics Committee (Ref: 29304).

Participants and Setting

The Network launch invited via email consumer advocates and people with expertise in preconception health, working in a range of sectors including health care, social care, public health and health policy, many of whom were leaders of relevant organisations. Due to COVID-19 restrictions in Victoria and New South Wales, the launch was an online event.

Recruitment and Consent

The aims and process of the Delphi technique were explained by a Network leader (JB), as well as the framework for the priority setting task. The Australian Policy Prioritisation Framework was the basis for the priority setting task, as it has been previously adapted for priority setting in maternal obesity prevention.^{30,31} The framework asked participants to consider several factors in relation to sub-optimal preconception health. These were: i) the health burden, ii) potential of prevention, iii) whether location or access to services plays a role, iv) provision of services, v) potential to improve health outcomes or services, vi) collaboration, vii) policy, viii) alignment with the vision of the Network, ix) collaborative

action and the development of improved health outcomes.^{30,31} Potential participants were given an opportunity to ask questions before breaking into smaller groups to discuss the overall vision and aims of the Network.

Two days after the Network launch, an email was sent to all attendees and an additional four experts in preconception health who could not attend the launch. This email included an invitation to participate in the Delphi technique, an Explanatory Statement, the priority-setting framework and a link to the round one online questionnaire. Participants confirmed their consent to participate in the introductory questions of the round one online questionnaire.

Data Collection

The structure and content of the Delphi technique was set by members of the Network (KB, JB, ED, RW) after a range of preliminary activities and a series of consultations. The Delphi technique was divided into three sections: i) PCC priority setting, ii) key strategies for addressing the priorities, and iii) underpinning values (►Table 1). A scoping review³³ of preconception guidelines in Australia informed the PCC priority setting section and the underpinning values section. For this review, a working party of Network members (JB, KB, KC, ED, KH, RW) reviewed national and state-based preconception guidelines available in Australia and New Zealand.³³ Delphi participants were asked to rank the health care priorities for PCC identified in this review, from most important to least important. Participants were then asked to draw on their expertise to identify key strategies for addressing the health care priorities for PCC in Australia. Underpinning values drawn from the scoping review and the Australian Health Research Alliance Women's Health, Research Translation Network and the National Women's Health Strategy were listed and participants were asked to rank their importance (1 being extremely important, 5 being

Table 1 The Delphi technique, with details of round one and round two online questionnaires

Sections	Round one online questionnaire (n = 23)	Workshops (n = 16)	Round two online questionnaire (n = 23)
PCC priority setting	<ul style="list-style-type: none"> Participants ranked 19 health care priorities in the provision of PCC. Participants added missing health care priorities in the provision of PCC. 	<ul style="list-style-type: none"> Results from round one were discussed. Priorities were grouped. 	<ul style="list-style-type: none"> Participants ranked 10 health care priorities in the provision of PCC. No additional priorities could be added. Participants responded to whether weight should be its own priority or grouped with health behaviors. Participants identified priorities with the the greatest opportunity for improvement.
Strategies	<ul style="list-style-type: none"> Participants identified key strategies to address priority areas. 	<ul style="list-style-type: none"> Key strategies were grouped. Wording was refined. Scope of each strategy clarified. 	<ul style="list-style-type: none"> Participants suggested final modifications for wording and scope.
Values	<ul style="list-style-type: none"> Participants ranked the importance of nine underpinning values identified. 	<ul style="list-style-type: none"> All values were deemed as important. Wording was refined. Scope of each value was clarified. 	<ul style="list-style-type: none"> Participants suggested final modifications for wording and scope.

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not important). Participants could add suggested priorities, strategies and values.

In round one, participants completed an online questionnaire. The online questionnaire was open for two weeks, with a reminder email sent after one week. Results from round one were collated and a summary was sent to participants who were able to participate in one of two online workshops. The online workshops gave participants an opportunity to debate the results and provide more in-depth feedback. Questions asked in the workshops were: i) Can any priorities be merged together? ii) Should any priorities be removed? iii) Should any priorities be added to the next ranking process? and iv) How do we word and define the key strategies and underpinning values? Combined results from round one voting and the online workshops were sent out to all participants with a link to the round two online questionnaire. Participants who were unable to attend either of the online workshops were asked to complete the round two online questionnaire. Again, the round two questionnaire was open for two weeks, with a reminder email sent after one week. A final Executive Summary was sent to all participants and participants could raise any questions or concerns via the Network email.

Qualtrics was used for round one and round two data collection. Online workshops were conducted via Zoom and audio-taped with a Dictaphone so that notes taken could be checked afterwards.

Data Analysis

A Nominal Group Technique was used for the priority setting section of the Delphi. A Nominal Group Technique requires participants to prioritize issues, ideas, or suggestions, to generate priorities for action or appropriate and targeted research questions.³⁴ In round one, the highest priority received a rank of one and the lowest priority received a rank of 19. Mean ranks were calculated and presented with their range (as opposed to standard deviation) in the mid-round and final summaries. After round one voting, key strategies were collated, with those suggested most often being identified in the workshops. Similar or related strategies were also grouped together (e.g., sugar taxes and increasing the price of tobacco were grouped with government policy). Mean scores for underpinning values were also calculated in round one. In round two, the Nominal Group Technique was used again to rank 10 preconception priorities. Participants were asked to provide feedback regarding the wording of the strategies and underpinning values.

Results

Of the 24 attendees with expertise in preconception health and two consumer advocates at the Network launch, 19 participated in the Delphi technique, one of these being a consumer advocate. An additional four experts who could not attend the launch also participated, giving a total of 23 participants in round one and round two voting. Sixteen participants including the consumer advocate were available

Table 2 Delphi participants, profession and state

	n = 23 (%)
Profession*	
Obstetrician/gynaecologist	7 (30.4)
Midwife	4 (17.4)
Public Health	3 (13.1)
Nursing (including primary care)	2 (8.7)
Bioethics	1 (4.0)
Community Advisor	1 (4.0)
Dietitian	1 (4.0)
Education	1 (4.0)
Geneticist	1 (4.0)
Epidemiology	1 (4.0)
Social Care	1 (4.0)
State	
Victoria	15 (65.2)
New South Wales	6 (26.1)
South Australia	1 (4.0)
Tasmania	1 (4.0)

* Many of our experts are also working in research, governance and academia.

to attend one of the two mid-round online workshops (→ **Tables 1** and **2**).

Round One

In the preconception priority setting section, 'medical history and optimization of pre-existing medical conditions' was ranked as the highest priority with a mean score (minimum, maximum) of 5.74 (1, 16). 'Sexually transmitted infection screening' was ranked as the lowest priority with a mean score (minimum, maximum) of 14.83 (5, 19). There was considerable variation in expert opinion, with most priorities ranked as the highest priority (ranked as 1), or as one of the lowest priority (ranked > 14), by at least one participant (→ **Table 3**). Participants suggested adding 'history of childhood trauma', 'available support networks', 'partner health', and 'isolation' as additional priorities. The predominant participant feedback was that ranking the priorities was difficult because all priorities were deemed important, and many were interconnected. Several participants suggested that priorities should be grouped (e.g., combine physical activity, nutrition, prenatal supplementation and weight into 'Health behaviors').

In the key strategies for the preconception health section, 64 suggestions were made. Some suggestions were the same but worded differently. Some suggestions could be grouped (e.g., 'sugar taxes' and 'increase floor price of alcohol and tobacco' were grouped into health policy). Suggestions were grouped into nine categories by the authors (KB, JB, ED, RW). The four groups with the most suggestions were: i) raising

Table 3 Results of PCC priority setting task (round one, workshops, round two)

ROUND ONE ONLINE QUESTIONNAIRE			WORKSHOPS	ROUND TWO ONLINE QUESTIONNAIRE		
Rank	PCC priority	Mean score (min, max)	Grouping of PCC priorities	Rank	PCC priority	Mean score (min, max)
1	Medical history and optimisation of pre-existing medical conditions	5.65 (1,16)	Medical history: medical history and optimisation of pre-existing medical conditions + obstetric history + medications + genetic history	1	Health behaviors: nutrition + physical activity + prenatal supplementation	2.52 (1, 6)
2	Weight	5.74 (1,19)	Healthy weight	2	Medical history: medical history and optimisation of pre-existing medical conditions + obstetric history + medications + genetic history	3.74 (1, 10)
3	Reproductive life planning	6.04 (1,19)	Reproductive health: reproductive life planning + contraception	3	Healthy weight	4.04 (1, 8)
4	Alcohol	7.57 (1,14)	Health behaviors: nutrition + physical activity + prenatal supplementation	4	Reproductive health: reproductive life planning + contraception	4.13 (1, 10)
5	Mental health	7.26 (1,16)	Mental health: mental health + available support networks + isolation	5	Mental health: mental health + available support networks + isolation	5.17 (1, 8)
6	Smoking	8.26 (1,18)	History of trauma or family violence	6	Substance use, smoking, alcohol	5.74 (2, 10)
7	Nutrition	8.39 (2,17)	Substance use, smoking, alcohol	7	History of trauma or family violence	6.30 (1, 10)
8	Physical activity	8.65 (2,18)	Partner health	8	Exposures: environmental exposures	7.70 (2, 10)
9	Prenatal supplementation	8.91 (1,18)	Screening: sexually transmitted infection screening + cervical screening + genetic screening	9	Partner health	7.83 (3, 10)
10	Domestic violence	10.30 (1,17)	Exposures: environmental exposures	10	Screening: sexually transmitted infection screening + cervical screening + genetic screening	7.82 (5, 10)
11	Medications	10.43 (3,17)				
12	Genetic history	11.35 (1,19)				
13	Obstetric history	11.43 (3,19)				
14	Contraception	11.48 (1,19)				
15	Substance use	11.87 (2,18)				
16	Vaccinations	13.61 (5,19)				
17	Environmental exposures	13.87 (3,19)				
18	Cervical screening	14.35 (9,19)				
19	Sexually transmitted infection screening	14.83 (5,19)				
To add	Available support networks, isolation, history of childhood trauma, partner health					

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community awareness/health promotion/education, ii) Medicare and health service reform, iii) development of guidelines/national guidelines, and iv) health professional education (► **Table 4**).

All underpinning values were ranked as being important or highly important (► **Table 5**).

Online Workshops

The focus of workshop discussions was ordering, and where relevant, grouping together the preconception priorities for

round two. Suggested new priorities were added and no priorities were removed. In the end, ten areas were agreed priorities (► **Table 3**). The main difference in opinion was whether weight should be grouped with health behaviors or not.

Participants then worked together to refine the wording of the key strategies and clearly define the scope of each one. Two of the key strategies, 'culturally tailored solutions' and 'collective strategies across sectors' were deemed to be underpinning values and therefore, moved to that section

Table 4 Results of key strategies to address PCC priorities (round one, workshops, round two)

ROUND ONE ONLINE QUESTIONNAIRE	WORKSHOPS	ROUND TWO ONLINE QUESTIONNAIRE
Most often raised	Distinction between most and least often raised removed	
Raising community awareness/health promotion/education	Public health campaigns: schools, workplaces, community, men, women	Public health and social care campaigns: schools, workplaces, community, men, women
Medicare and health service reform	Service reforms: Medicare item number, alternate funding models, nurses (including practice nurses, midwives, maternal and child health), access to care, resources available, improving health care safety and access	Health service reforms: Medicare item number, alternate funding models, nurses (including practice nurses, midwives, maternal and child health), access to care, resources available, improving health care safety and access
Existence of guidelines/national guidelines	Preconception guidelines	Preconception guidelines, health professional and social care education
Health professional education	Health professional education	
Less often raised	Recognition by government: health policy such as sugar taxes, increase floor price of alcohol and cigarettes	Shaping health policy
Collective strategies across sectors (key stakeholders, multi-College, integration of health and social care)	Digital technology – cross cutting	Digital technology as a platform for education, health promotion and health care
Recognition of the importance for public health by government, policies such as increased floor price on smoking and alcohol, sugar tax, include as part of women's health strategy	Education for the community and improving health literacy	Education for the community and improving health literacy
More digital technology		
Less traditional methods of delivery		
Culturally tailored solutions (communication barriers, early support for groups at risk, special consideration for First Nations)		
Improve equity of access to care with special consideration for Aboriginal and Torres Strait Islander peoples and their preconception health care needs is required to improve overall health outcomes	Note: Culturally tailored solutions (communication barriers, early support for groups at risk, special consideration for First Nations) AND Collective strategies across sectors (key stakeholders, multi-College, integration of health and social care) should be underpinning values. Explicit inclusion of practice nurses and midwives.	

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Table 5 Results of underpinning values task (round one, workshops, round two)

ROUND ONE ONLINE QUESTIONNAIRE			WORKSHOPS	ROUND TWO ONLINE QUESTIONNAIRE
Rank	Underpinning value	Mean score (minimum, maximum)	Re-wording of underpinning values (education for population and health professionals were moved to key strategies)	Re-wording of underpinning values
1	Community engagement (consumers and stakeholders) and co-design	1.22 (1,2)	Community engagement (consumers and stakeholders) and co-design	Community engagement (consumers and stakeholders) and co-design
2	A life course approach to health research that encompasses the social and economic determinants of health	1.26 (1,3)	A life course approach to sexual and reproductive health, recognizing it as a state of physical, emotional, mental and social well-being	A life course approach to sexual and reproductive health, recognizing it as a state of physical, emotional, mental and social well-being
3	Informing advocacy and policy	1.39 (1,3)	An integrated multi-sectorial approach	An integrated multi-sectorial approach
4	Education for population	1.39 (1,5)	Leveraging and strengthening large scale national collaboration	Leveraging and strengthening large scale national collaboration
5	Leveraging and strengthening large scale national collaborative effort to improve preconception health	1.39 (1,2)	Health equity and tailored solutions that incorporate diversity	Health equity and tailored solutions that incorporate diversity
6	Health equity between people across priority populations	1.52 (1,3)	Aboriginal and Torres Strait Islander health equity	Aboriginal and Torres Strait Islander health
7	Delivering research, translation and impact in agreed priority areas	1.52 (1,3)	Real world impact that encompasses clinical, policy and population (including improved measurable outcomes)	Real world impact that encompasses clinical, policy and population (including improved measurable outcomes)
8	Education for health professionals	1.61 (1,4)	Research capacity building	Research capacity building
9	Building capacity in researchers across priority groups and diverse disciplines	1.91 (1,4)	Recognize the importance of the social and economic determinants of health	Recognize the importance of the social and economic determinants of health

(► **Table 4**). The rest of the time in the workshops was spent on refining the wording of the underpinning values, defining them to ensure that they would meet the needs of the priority populations. ‘Education for health professionals’ and ‘education for population’ were deemed key strategies and therefore, moved to that section (► **Table 5**).

Round Two

Combining priorities resulted in one main change in the PCC priority setting. ‘Health behaviors’ incorporating physical activity, nutrition and prenatal supplements was ranked highest. All other priorities were ranked similarly to round one, with only small changes due to the combining and addition of priorities (► **Table 3**). When asked whether weight should be on its own as a priority, 12 (52.2%) selected ‘No’.

When asked what priorities have the greatest opportunity for improvement, ‘reproductive life planning’ was identified by nine participants. ‘Health behaviors’ was often paired

with ‘healthy weight’, with one or both being identified seven times. ‘Partner health’ was identified five times, ‘mental health’ four times, ‘trauma and family violence’ was identified twice, and ‘environmental exposures’ was identified once. One participant responded with, “I think there are gaps in all areas that can be worked on.” Another participant acknowledged that some priorities may be more difficult to address in some groups than others with, “I think it depends on the groups we are working with. For example, whilst smoking and alcohol are not universally a problem, they are in particular groups.” This participant also highlighted that, “[reproductive life planning] is more broadly relevant to all.”

Two changes in the wording of key strategies were being explicit about the inclusion of ‘social care’, and the combination of ‘preconception guidelines’ with ‘health professional and social care education’ (► **Table 4**). Minimal changes were suggested for underpinning values (► **Table 5**).

When asked how the Network can work together to address the preconception priorities, a range of suggestions

that could be categorised into key strategies and underpinning values were listed (– **Supplementary Table S1**).

Discussion

This Delphi technique to identify and rank health care priorities for PCC in Australia can be used to direct key stakeholders including research, health care, education, social care, and government in their efforts to improve preconception health and pregnancy outcomes. The technique was based on peer-reviewed evidence from existing preconception guidelines³³ and expert opinion across a range of sectors. After ranking activities, discussion, and debate, ten priority areas were identified, with health behaviors (nutrition, physical activity, prenatal supplementation), medical history (including optimization of pre-existing medical conditions, obstetric history, medications, genetic history), and reproductive health (reproductive life planning, contraception) ranked most highly. Six key strategies were identified to address the priorities. Future work in PCC should be guided by underpinning values that promote engagement with key stakeholders, a life course view of preconception health, an integrated multi-sectorial approach and strengthening large scale collaboration. Priority populations should be considered within the social determinants of health when planning and implementing interventions that deliver real world impact across health care, social care, policy, and population health.

Preconception Priorities

There was broad agreement that the 19 preconception priorities identified in the scoping review should be grouped to reflect their interconnectedness and simplify messaging to key stakeholders. Grouping the priorities occurred via robust workshop discussions with very little disagreement. In round two, health behaviors were ranked as the highest priority, above medical history that was ranked as the highest priority in round one.

Australia's national pregnancy care guidelines³⁵ provide recommendations regarding a range of pre-existing medical conditions during pregnancy (not PCC), and over the counter and prescription medicines that may be teratogenic. In addition, increasing proportions of women in Australia are starting pregnancy with pre-existing medical conditions such as obesity³ and type 2 diabetes.^{36,37} Rates of overweight, obesity and type 2 diabetes are also increasing in men.³⁸ This substantiates the high priority placed on medical history in the priority setting task. One reason why health behaviors were ultimately ranked higher than medical conditions is that many pre-existing medical conditions can be prevented by optimizing health behaviors, including nutrition and physical activity in the preconception period. Another reason was that optimizing health behaviors is relevant to all people, regardless of their pregnancy intentions.

Prenatal supplementation was grouped into health behaviors because it was considered a crucial aspect of preconception nutrition. In addition to the public health

measure of mandatory folic acid fortification of wheat flour for bread making in Australia,³⁹ folic acid supplementation (400ug/day in most cases) is recommended in the month before pregnancy and throughout the first trimester to prevent neural tube defects⁴⁰; however, in a national study of women in Australia⁴¹ ($n = 857$) only 27% reported taking folic acid as recommended. Many of the women in this study were unaware of the correct folic acid dose and received inconsistent, incorrect or no advice from health professionals.⁴¹ A higher dose of folic acid supplementation (5-mg/day) is indicated for women with obesity, diabetes, risk of malabsorption, women taking anticonvulsant medications, or a history of neural tube defects.⁴² Iodine supplementation (150ug/day) is also recommended throughout pregnancy and lactation for the synthesis of thyroid hormones and fetal neurodevelopment⁴³; however, many women in Australia experience at least a mild deficiency due to inadequate supplementation.⁴⁴ Again, women's and health professionals' limited knowledge of iodine supplementation requirements in Australia contributes to this issue.^{41,44,45} Prenatal supplementation is an acceptable, safe, and low-cost public health strategy to prevent a range of serious adverse offspring outcomes, yet uptake in Australia is far from universal.⁴⁴

The only disagreement in the priority setting activity was whether weight should be a stand-alone priority or be grouped together with nutrition, prenatal supplementation, and physical activity in health behaviors. An argument for grouping weight in health behaviors was that addressing suboptimal weight (underweight, overweight, obesity) will always involve lifestyle modification, with or without a biomedical approach. An argument for keeping weight as a separate priority was that there are many causes for suboptimal weight and, among women with obesity, it is not simply a matter of poor nutrition or physical inactivity. For example, women with polycystic ovary syndrome⁴⁶ or depression,⁴⁷ people who experience food insecurity⁴⁸ and people who have experienced childhood trauma⁴⁹ are more likely to have a body mass index in overweight or obese categories. These issues can be interrelated and are not necessarily addressed with nutrition and physical activity alone. In the end, there was no consensus regarding whether weight should be its own priority. The extensive discussions highlight that suboptimal weight cannot be treated in isolation from the cause.

Reproductive health, including reproductive life planning and contraception was ranked after weight. Reproductive life planning engages individuals or couples in conversations around their personal goals regarding if and when to have children, based on their priorities⁵⁰ and is another acceptable, safe and low-cost approach to improve preconception health. Health professionals ask a series of questions, starting with, 'Do you plan to have any (more) children?'⁵¹ Depending on the answer, people are guided into conversations around contraception, intervals between pregnancies and a range of other topics including all the preconception priorities identified (– **Table 3**). Lifestyle and advanced maternal age have driven the increase of the proportion of women becoming

pregnant with pre-existing medical conditions such as type 2 diabetes and obesity.³⁶ Many women are unaware of the impact of their or their partner's age on fertility, or other contributing health factors that may impact pregnancy outcomes.^{52,53} Reproductive life planning conversations create opportunities to raise awareness of reproductive health choices, to learn about the importance of health when planning a pregnancy, and for decision-making to be supported.⁵⁴ It is important that health professionals facilitate conversations that are culturally appropriate and consider health literacy needs.

'Mental health', 'substance use, smoking and alcohol', 'history of trauma or family violence', and 'partner health' were ranked fourth, fifth, sixth, seventh and ninth, respectively, highlighting the necessary involvement of other sectors including social care in the provision of PCC. Environmental exposures and screening for STIs, cervical screening and genetic screening were also acknowledged as being important.⁵⁵

Key Strategies

The mid-round workshops facilitated discussion that consolidated a long list of suggested strategies to address the preconception priorities identified. These strategies were agreed upon in round two and were not ranked. Social care was explicitly added to the strategies (e.g., public health and social care campaigns; health professionals and social care education) acknowledging the important role of social care in reaching priority populations including those who have experienced trauma, disadvantage or both.

The scoping review³³ that informed this Delphi technique revealed gaps in the scope, content, presentation, and availability of PCC guidelines in Australia and New Zealand. Comprehensive PCC guidelines that target a range of health and social care professions, and are developed with input from key stakeholders and community advisors are needed.³³ A subsequent systematic review of international PCC guidelines conducted by members of the Network will further guide work in this area.

Preconception care is primarily perceived to be the role of general practitioners in primary care.²³ Current funding models only support general practitioner-led care and some nurse practitioners, despite it also being provided by primary care health nurses including community health nurses, midwives, maternal and child health nurses, women's health nurses and Aboriginal and Torres Strait Islander health workers. Another issue with the focus on general-practitioner led care is that there is no Medicare item number to bill for PCC consultations.^{19,22} An appointment where an individual presents for PCC is likely to be billed with item number 23 (professional attendance to which no other item applies, \$39.10, less than 20 minutes)⁵⁶ or item number 36 (professional attendance to which no other item applies, \$75.75, longer than 20 minutes).⁵⁷ Comprehensive PCC that covers all preconception priorities is not possible in a consultation that is less than 20 minutes, particularly for those with complex histories. Gap fees may apply for longer consultations, creating further disadvantage for those who rely

on bulk-billed consultations. A potential solution may be a designated item number for PCC, thus increasing the profile and accessibility of this type of care.¹⁹ Another option may be to support broadening the scope of primary health care nurses to provide PCC.^{19,58} This predominantly female workforce represents a significant opportunity to improve access and timeliness of high quality preconception care, particularly for women. More work is required to explore the issues and possibilities in the complex area of health service funding.

Strategies to address the priorities were interrelated. For example, education for the community and improving health literacy are likely to involve digital technology; and digital technology can also be used in the provision of PCC. Shaping health policy is likely to impact on all strategies, with advocacy required for health policy that prioritizes population level preconception health and priority populations.

Underpinning Values

The wording and scope of the underpinning values were clarified in the mid-round workshops. These values were agreed upon in round two and not ranked. Despite the values not being ranked, notable discussion was had around recognizing a life course approach to sexual and reproductive health, the social and economic determinants that impact on preconception health, and priority populations.

Health equity and tailored solutions that incorporate diversity cautions against 'one-size-fits-all' thinking and strategies that meet the needs of the majority while overlooking priority populations or individuals with complex needs. It was agreed that Aboriginal and Torres Strait Islander health should be a value in itself because of the significant and persistent disparities in preconception health and pregnancy outcomes, compared with other Australians.⁵⁹ Gibson-Helm et al⁶⁰ also engaged with key stakeholders to identify practice gaps in Aboriginal and Torres Strait Islander maternal health care, barriers and enablers of care, and strategies to address priorities. Similar to our research, Gibson-Helm et al⁶⁰ reported health behaviors such as nutrition, substance use and psychological wellbeing as priorities. Our research documented general strategies to address identified priorities across populations while the strategies identified by Gibson-Helm et al⁶⁰ very were specific to Aboriginal and Torres Strait Islander peoples. For example, culturally appropriate health service reforms including systems that promote continuity of care, workforce capacity building with Aboriginal and Torres Strait Islander workers, and culturally appropriate resources were identified as strategies. Accessibility to food and housing were also acknowledge, highlighting the importance of considering the specific needs of particular groups, as well as the broader population.

Community engagement with consumers and stakeholders and co-design should underpin all work moving forward. This can be applied to all key strategies identified. For example, the National Health and Medical Research Council clearly outlines the requirements relating to community engagement in that development of clinical practice

guidelines.⁶¹ Another example is in health service reforms. Formative work with women and health professionals confirming the acceptability of primary health care nurses providing PCC has been conducted¹⁹; however, further work with key stakeholders in primary care, social care, policy and the community is required to co-design PCC that is accessible and that meets people's needs and expectations.⁶²

Increasing research capacity, particularly among those from diverse backgrounds, was considered an important component of developing and evaluating PCC with real world impacts across clinical work, social care, policy and populations. An integrated multi-sectorial approach and leveraging and strengthening large scale collaborations would mitigate siloed approaches within dynamic and interconnected health and social care systems.

The interconnectedness of the values (e.g., 'Research capacity building' and 'Real world impact that encompasses clinical, policy and population - including improved measurable outcomes'; 'Health equity and tailored solutions that incorporate diversity' and 'Aboriginal and Torres Strait Islander health') and applicability of the values to the key strategies ('A life course approach to sexual and reproductive health, recognizing it as a state of physical, emotional, mental and social well-being' and 'Education for the community and improving health literacy') suggests that these values are appropriate and will guide the Network and key stakeholders as they work together to improve PCC in Australia.

Strengths and Limitations

The Network developed this Delphi technique to guide the future provision of PCC in Australia. An advantage of a Delphi technique in health care is that experts and community advisors can draw on a range of resources, expertise, and experiences to inform their input and develop a consensus.³² The selection of PCC priorities and underpinning values was based on peer-reviewed evidence from existing preconception guidelines.³³ The priorities and values were ranked by participants with expertise in preconception health from range of sectors and Australian states and a community advisor. Multiple opportunities for engagement, including face-to-face discussions via videoconference, facilitated robust discussion regarding the priorities, key strategies and values and all Delphi participants had time to consider and then re-consider their views.

Those currently working in other Australian states and territories (Western Australia, the Northern Territory and Queensland) were not represented in our group; however, many participants worked within national organizations or collaborated nationally. The COVID-19 pandemic hindered opportunities to meet face to face, but this was mitigated with the use of videoconferencing. As shown in ► **Table 2**, we had participant representation across health and social care. However, a large proportion of participants had a background in obstetrics and gynecology or midwifery, therefore responses may have been weighted more from the perspective of these professionals.

Conclusion

Participants with expertise in preconception health across a range of sectors with a community advisor identified ten priority areas for PCC in Australia in this Delphi technique. Health behaviors, medical history, weight, and reproductive health were ranked most highly. Six key strategies were identified to address the priorities and future work should be guided by underpinning values that promote engagement with key stakeholders, a life course view of preconception health, an integrated multi-sectorial approach and strengthening large scale collaboration. Priority populations should be considered in all aspects of PCC, strategies and values and in planning and implementing interventions that deliver real world impact across health care, social care, policy, and population health.

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Conflict of Interest

None declared

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