WESTERN SYDNEY UNIVERSITY

Developing and Piloting the Grinnin' Up Mums & Bubs Model of Care to Promote Oral Health Among Aboriginal and Torres Strait Islander Pregnant Women: A Mixed-Methods Study

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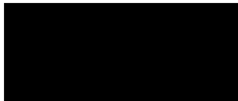
A thesis submitted to fulfil the requirements of a Doctor of Philosophy (PhD) degree

Declaration

The work presented in this thesis is, to the best of my knowledge and belief, original, except as acknowledged in the text. I hereby declare that ethical clearance was obtained for this body of research and I have not submitted any material contained herewith, either in full or in part, for a degree in this or any other institution.

Signature: 

Date: 27th November 2021

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Anthology of Publications

Quality Publications Statement

I confirm the following:

- All the publications are indexed on Web of Science/Scopus
- I am the first author on the five publications in this thesis (note: the candidate's surname was changed from *Villarosa* to *Kong* in 2019)
- All publications are published in Q1 & Q2 journals and no lower than Q3
- The papers have been peer reviewed

Signature: **Date:** 27th November 2021

Peer-Reviewed Papers

1. **Kong AC**, Ramjan L, Sousa MS, Gwynne K, Goulding J, Jones N, Srinivas R, Rambaldini B, Moir R, George A. The oral health of Indigenous pregnant women: a mixed-methods systematic review. Women and Birth. 2020;33(4):311-22. doi: 10.1016/j.wombi.2019.08.007 (IF: 3.172; Quartile: Q1; Citations: 11)

2. **Villarosa AC**, Villarosa AR, Salamonson Y, Ramjan LM, Sousa MS, Srinivas R, Jones N, George A. The role of indigenous health workers in promoting oral health during pregnancy: a scoping review. BMC Public Health. 2018;18(1):381. doi: 10.1186/s12889-018-5281-4 (IF: 4.003 (5-year); Quartile: Q1; Citations: 16)

3. **Kong AC**, Sousa MS, Ramjan L, Dickson M, Goulding J, Gwynne K, Talbot F, Jones N, Srinivas R, George A. "Got to build that trust": the perspectives and experiences of Aboriginal health staff on maternal oral health. International Journal for Equity in Health. 2020;19(1):187. doi: 10.1186/s12939-020-01301-5 (IF: 2.378; Quartile: Q1; Citations: 2)

4. **Kong A**, Dickson M, Ramjan L, Sousa MS, Goulding J, Chao J, George A. A qualitative study exploring the experiences and perspectives of Australian Aboriginal women on oral health during pregnancy. International Journal of Environmental Research and Public Health. 2021;18(15):8061. doi: 10.3390/ijerph18158061 (IF: 3.39; Quartile: Q2; Citations: 1)

5. **Kong A**, Dickson M, Ramjan L, Sousa MS, Jones N, Srinivas R, Chao J, Goulding J, George A. Aboriginal Health Workers promoting oral health among Aboriginal and Torres Strait Islander women during pregnancy: development and pilot testing of the Grinnin' Up Mums & Bubs program. International Journal of Environmental Research and Public Health. 2021;18(18):9576. doi: 10.3390/ijerph18189576 (IF: 3.39; Quartile: Q2)

Table 1 provides more information of the individual author contributions to the respective manuscripts. Refer to Appendix 14 for consent from all co-authors to include the publications in this thesis.

Table 1 *Author Contributions to Peer-Reviewed Manuscripts*

Author	Study Design & Methodology	Data Collection	Data Analysis/ Interpretation	Manuscript Draft	Manuscript Revisions	Manuscript Approval	Aboriginal cultural expertise
Ariana Kong	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	
Ajesh George	1, 2, 3, 4, 5	1, 2, 5	1, 2, 3, 4, 5	5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	
Lucie Ramjan	3, 4, 5	1, 3, 5	1, 2, 3, 4, 5		1, 2, 3, 4, 5	1, 2, 3, 4, 5	
Mariana S. Sousa	3, 4, 5	1, 5	1, 2, 3, 4		1, 2, 3, 4, 5	1, 2, 3, 4, 5	
Michelle Dickson	4, 5	5	3, 4	5	3, 4, 5	3, 4, 5	3, 4, 5
Joanne Goulding	3, 4, 5	3, 5	1, 3, 4		3, 4, 5	1, 3, 4, 5	1, 3, 4, 5
Nathan Jones	3, 5		1, 2		2, 5	1, 2, 3, 5	1, 2, 3, 5
Ravi Srinivas	3, 5		1, 2		2, 5	1, 2, 3, 5	
Kylie Gwynne	3		1, 3		1, 3	1, 3	
Boe Rambaldini			1			1	1
Rachael Moir			1			1	
Amy Villarosa		2	2		2	2	
Yenna Salamonson			2		2	2	
Folau Talbot			3			3	3
Jemma Chao	4	5	4		4, 5	4, 5	4, 5

Note: The column, Aboriginal cultural expertise, has been included to highlight the contributions of Aboriginal and Torres Strait Islander investigators on this project. These may not have been highlighted in the author contributions in the corresponding manuscripts.

Conferences

International

1. **Kong, A**, Goulding, J, Ramjan, L, Sousa, M, Jones, N, Srinivas, R, Gwynne, K, Moir, R, Rambaldini, B, George, A. Empowering Aboriginal and Torres Strait Islander women to improve oral health during pregnancy: Can we adapt a model? *The Lowitja Institute International Indigenous Health and Wellbeing Conference*, 18-20 June, 2019, Darwin Convention Centre, Darwin.

National

2. **Villarosa, A**, Sousa, M, Ramjan, L, Jones, N, Srinivas, R, Goulding, J, Rambaldini, B, Moir, R, George, A. Improving the antenatal oral health of Aboriginal pregnant women—A community-driven model. *The 4th Australian Nursing and Midwifery Conference*, 2-3 May, 2019, Newcastle Convention Centre, Newcastle

Local

3. **Villarosa, AC**, Villarosa, AR, Salamonson, Y, Ramjan, LM, Sousa, MS, Srinivas, R, Jones, N, & George, A. The role of indigenous health workers in promoting oral health during pregnancy: a scoping review. *Songlines: Our Languages Matter* (Aboriginal and Torres Strait Islander Research Symposium), 23-24 October, 2017, Western Sydney University (Parramatta Campus).
4. **Kong, A**, Dixon, S, Ramjan, L, Sousa, MS, Goulding, J, Jones, N, Srinivas, R, Gwynne, K, Moir, R, Rambaldini, B, George, A. Co-designing an oral health model of care for Aboriginal pregnant women: Exploring the needs of Aboriginal Health Workers. *The Inaugural Joanna Briggs Collaboration Regional Symposium in Evidence-based Healthcare*, 28 June, 2019, St George Hospital, Kogarah.

5. **Kong, A**, George, A, Ramjan, L, Sousa, M, Goulding, J, Dickson, M. (2019). Capacity building Aboriginal health workers in oral health promotion: A new model of care for Indigenous pregnant women. *Indigenous Research Forum,* 25 October 2019, Western Sydney University (Parramatta Campus)
6. **Kong, A**, George, A, Ramjan, L, Sousa, M, Goulding, J, Dickson, M. (2019). Working together with Aboriginal Health Workers to promote oral health in an enhanced model of care for pregnant women. *The 8th Annual Poche Indigenous Health Network Research Showcase,* 17 October 2019, The University of Sydney.

Awards

1. **Kong, A.** (2021). Winner of School 3 Minute Thesis Competition, Nursing & Midwifery, *2021 SoNM Higher Degree Research Conference*, 1-2 July 2021, Western Sydney University.
2. **Kong, A.** (2021). Winner of 3 Minute Thesis People's Choice Award, Nursing & Midwifery, *2021 SoNM Higher Degree Research Conference*, 1-2 July 2021, Western Sydney University.
3. **Kong, A.** (2021). Best Third-Year Presentation – Day Two, Nursing & Midwifery, *2021 SoNM Higher Degree Research Conference*, 1-2 July 2021, Western Sydney University.

Grants

1. **Villarosa, AC**, George, A, Sousa, M, Ramjan, L. (2018). Capacity building Aboriginal health workers in oral health promotion: A new model of care for Aboriginal and Torres Strait Islander pregnant women ($10,000 – Category 2), South Western Sydney Local Health District.

2. **Villarosa, A**, Sousa, M, George, A, Ramjan, L, Jones, N, Srinivas, S, Goulding, J, Moir, R, Rambaldini, B, Gwynne, K. (2019). Capacity building Aboriginal Health Workers: Improving the oral health of Aboriginal pregnant women and children ($10,000 – Category 3), SPHERE Aboriginal Health & Wellbeing Stream CAG Small Grant Scheme.

Videos

1. August 2019: Featured in an "Educating the community" video with the Ingham Institute for Applied Medical Research as a featured researcher at the institute to discuss successful engagement with the local Aboriginal and Torres Strait Islander community – https://inghaminstitute.org.au/awards2019/

2. August 2019: Featured in a "Share Our Stories" project film discussing partnerships with Aboriginal communities for the Aboriginal Health and Wellbeing Clinical Academic Group, Maridulu Budyari Gumal - Sydney Partnership for Health, Education, Research & Enterprise (SPHERE) - *https://www.thesphere.com.au/news/partnership-the-key-to-powerful-aboriginal-health-research*

List of Abbreviations

Abbreviations	
ACCHS	Aboriginal Community-Controlled Health Service
AFBP	Aboriginal Family Birthing Program
AH&MRC	Aboriginal Health & Medical Research Council
AHW	Aboriginal Health Worker
AMGPP	Aboriginal Maternity Group Practice Program
AMIHS	Aboriginal Maternal and Infant Health Service
ANFPP	Australian Nurse-Family Partnership Program
CDBS	Child Dental Benefits Scheme
COAG	Council of Australian Governments
COHI	Children's Oral Health Initiative
COHORT	Centre for Oral Health Outcomes & Research Translation
COVID-19	Coronavirus-2019 Pandemic
CPD	Continuing Professional Development
ECC	Early Childhood Caries
FPW	Family Partnership Worker
GP	General Practitioner
GWS	Greater Western Sydney
IHW	Indigenous Health Worker
JBI	Joanna Briggs Institute
MIOH	Midwifery Initiated Oral Health
NHS	National Health Service
NSW	New South Wales
OHIP-14	14-item Oral Health Impact Profile
PAR	Participatory Action Research
SWSLHD	South Western Sydney Local Health District
TTM	Trans-Theoretical Model
UK	United Kingdom
UN	United Nations

Glossary

Term	Definition
Aboriginal and Torres Strait Islander peoples/Australians	Referring specifically to the multitude of distinct peoples and nations who were the first peoples and custodians to inhabit the lands in Australia.
ACCHS (Aboriginal Community-Controlled Health Service)	A non-government primary health care service that is initiated by, based in, and provides health services and programs for the local Aboriginal and Torres Strait Islander community. Health services and programs that are delivered through ACCHSs and Aboriginal medical services focus on providing holistic and culturally competent health care.
Aboriginal health staff	A person of Aboriginal and Torres Strait Islander descent who provides a health care service to clients.
AHW (Aboriginal Health Worker)	Also known as Aboriginal and Torres Strait Islander Health Workers (although often referred to as AHWs). An AHW is an Aboriginal and Torres Strait Islander person who has at least a vocational qualification (Certificate III in Australia) within primary health care. Some AHWs also have university degrees in a wide range of fields, often relating to social work and health care.
Access	The use of health services and the factors that facilitate or prevent the use of these services.
Antenatal	Referring to the period before birth – during and relating to a woman's pregnancy.
Anticipatory guidance	Advice given by health care providers, often to parents or guardians, to understand the expected growth and development of children.
Capacity build	In this study, it refers to improving an individual's (or organisation's) ability to perform an intended duty with an expected outcome.
Caries (dental decay)	A permanently damaged area of the tooth (beginning with the outer enamel layer), manifesting as small holes.
CDBS (Child Dental Benefits Scheme)	An Australian national government initiative that provides individuals aged 2-17 years a dental voucher of AUD $1013 over a two-year period to use at private dental services. Children who are eligible for this initiative in families that receive an Australian government payment.
Close the Gap	A coalition driven by both Aboriginal and Torres Strait Islander, as well as non-Indigenous, health and community organisations to ensure that measurable action and change takes place to achieve health equality by 2030.
Closing the Gap	Refers to the Australian government's response to address the significant inequality in the health, wellbeing and lives of Aboriginal and Torres Strait Islander Australians compared to non-Indigenous Australians.

Colonisation	During the 1700s, the British government recognised Australia to be *terra nullius* (a Latin word referring to a *land belonging to nobody*), providing a legal basis to unilaterally dispossess the land from the existing landowners. Colonisation refers to the process in which the British government began to settle and occupy the land.
Community	A complex term; in this study it refers to the connections, relationships and kinships between Aboriginal and Torres Strait Islander peoples within local areas. Having a sense of community and connection is especially important for many Aboriginal and Torres Strait Islander families.
Confirmation of Aboriginality	Certain organisations may request people to provide a 'Confirmation of Aboriginality' to access Aboriginal and Torres Strait Islander-specific services or programs. To acquire these documents will often require the applicant to meet certain criteria. While this is quite a complex process and various places may have different criteria, the criteria may include items such as: the person identifies as Aboriginal or Torres Strait Islander descent, the person (or their family) is accepted as such in the community in which a person lives or previously resided. Applications for the confirmation are typically reviewed by a registered Aboriginal and Torres Strait Islander community organisation, which will also issue the documentation.
Country	Often used by Aboriginal and Torres Strait Islander peoples to describe the lands, waterways and seas to which there is a connection with the person. Country is more than a place; it encompasses complex concepts such as law, lore, family, identity, customs and culture.
CPD (continuing professional development) points	In Australia, this refers to the activities undertaken by professionals to develop and enhance their knowledge, practice, and experience within their field of expertise.
Cultural competency	In this study, it refers to the set of skills, attitudes, behaviours and policies that are adopted by a person or system to enhance effective cross-cultural care or services.
Cultural determinants	In this study, it refers an Aboriginal and Torres Strait Islander definition of health and wellbeing, and concentrating on the values from which individuals, families and communities can harness strength and empowerment. Focusing on just social determinants of health can overlook the impact of structural and cultural factors on Aboriginal and Torres Strait Islander wellbeing.
Cultural lens	In this study, this term is used to acknowledge that each person has a worldview shaped by their culture.
Cultural safety	Where both health care providers and health care systems reflect on the impact of personal assumptions, biases, attitudes, and prejudices on the quality of health care that is delivered to people. Cultural safety acknowledges that these perspectives arise from the individual's cultural or social values. However, cultural safety also involves a process of self-reflection and awareness of these perspectives so that health care providers and organisations can

	address these assumptions and biases, and progress towards equity in the health care setting.
Decolonisation	Decolonisation refers to the process of undoing colonialism. While this can refer to the dismantling of colonial empires, it also encompasses the existing cultures, practices, systems, attitudes and policies that continue to perpetuate the philosophies underpinning colonialism. Decolonisation is the process undertaken by systems and individuals to challenge dominant perspectives and restore Indigenous knowledge, cultures and ways.
ECC (early childhood caries)	See 'Caries'. ECC occurs when children experience dental decay between birth and 71 months.
Elders	Elders in Aboriginal and Torres Strait Islander communities, not to be confused with elderly people, are highly respected and recognised by the community as persons gifted with knowledge and wisdom to provide leadership, education, spiritual guidance and healing for the community.
Equality	Individuals or groups receiving an equal amount of resources and opportunities.
Equity	Recognising that individuals and groups do not have the same background or needs, thus resources and opportunities are allocated based on differences in needs.
Ethnocentrism	In this study, it refers to the belief that the colonial culture or way of life was the best way.
FPW (Family Partnership Worker)	In this study, this term refers to an Aboriginal and Torres Strait Islander person who works within the Australian Nurse Family Partnership Program. An FPW does not necessarily have the same qualification as an AHW, but their services aim to provide culturally safe antenatal care.
First Nations/First Peoples	See 'Indigenous peoples'. Alternative term to Indigenous peoples.
GP (General Practitioner)	A medical doctor who is qualified in general practice medicine. In Australia, they are typically the first point-of-contact for many people, and they also coordinate health care for individuals.
Gingivitis	Mild inflammation of the gum (gingiva).
Glycaemic control	Referring to the balance of maintaining optimal blood sugar levels, often in reference to a person who has diabetes.
Health Care Card	A concession card issued by the Australian government for people to obtain medicines or services at a subsidised cost. People who receive ongoing government payments are generally eligible for a Health Care Card.
Imperialism	The policies or ideology around one group of people (nation) increasing their influence, power, and control over another group of people or region, often involving military action.
Indigenous peoples	Respectfully referring collectively to the diversity of all distinctive peoples, cultures, and identities worldwide who identify as being descendants of the first peoples or custodians of a specific region.

Indigenous Health Worker	An Indigenous person (see 'Indigenous peoples') who provides health care services. In this study, it refers specifically to a person who may bridge the gap between non-Indigenous health care providers and services and Indigenous peoples. They may provide cultural brokerage, health care advice or support and often take on multiple roles to ensure holistic care.
Indigenous paradigm	In this study, it refers to a paradigm (worldview) that aligns with Indigenous ontology, epistemology, axiology, and methodology and recognises Indigenous ways of knowing, being and doing.
Institutional racism	Also known as systemic racism. In this study, it is referred to as a more subversive form of racism that is embedded within the policies and regulations within an organisation, as well as within society.
Intergenerational trauma	Trauma refers to a person's response to an overwhelming event that leaves a person unable to cope with the experience. British colonisation in Australia and subsequent policies dispossessed many Aboriginal and Torres Strait Islander Australians from culture, land, language, kinship group and identity. For some people, the trauma from colonisation has been passed down from older to younger generations in the form of mental health problems, violence, parenting practices and behavioural problems.
Kinship	A complex concept used by Aboriginal and Torres Strait Islander peoples to identify their relationship and responsibilities to people, to the land, to resources, and their place in the world.
Low birth weight	Defined as a child's weight upon delivery being less than 2500 grams.
Maternity exemption certificate	A certificate issued by the National Health Service in the United Kingdom that a person is pregnant or has a baby.
Medicare	Medicare is Australia's universal health insurance scheme that ensures health coverage for both Australian residents and overseas visitors. Under this scheme, recipients can access a range of health care services at a partially or fully subsidised cost.
MIOH (Midwifery Initiated Oral Health)	The Midwifery Initiated Oral Health program is a model of care developed in Australia where midwives are trained to provide oral health education, screening, and referrals to pregnant women.
Oral health model of care	Refers broadly to the way that oral health can be delivered and promoted.
Oral health promotion	In this study, it refers to the action of healthcare providers (including non-dental care providers) providing basic oral health advice, screening clients at risk for poor oral health, and providing appropriate referrals to dental services.
Outreach program/service	In this study, it refers to a health care provider delivering a service in a location that is convenient to the client, often within the client's home.
PAR (Participatory Action Research)	In this study, PAR refers to a research methodology that has its roots in Indigenous history and is inherently designed to support community members to identify community problems and solutions, and are provided the support to address this.

Periodontal (gum) disease	Chronic inflammation of the gum (gingiva), ligaments and bony structures that hold the tooth in place. Periodontal disease can lead to tooth and bone loss.
Postnatal	Relating to the period after childbirth.
Pre-eclampsia	A high-risk pregnancy complication characterised by high blood pressure.
Pre-term birth	The delivery of a baby before 37 weeks gestation.
Racism	Prejudice and discrimination of an individual, community, or organisation against another person or people based on racial or ethnic differences.
Screening tool	In this study, it refers to a brief questionnaire that is used to determine risk of a health problem.
Self-determination	The right of a person and peoples to be able to freely determine and pursue economic, social and cultural development.
Self-efficacy	A person's belief in their capacity to carry out behaviours to achieve an intended outcome.
Shame	While the English word 'shame' is typically used to refer to feelings of humiliation caused by doing something wrong, this term is used throughout this thesis to encompass feelings associated with a fear of disapproval or judgement, shyness, embarrassment, a lack of respect and breaches of cultural and social norms.
Stolen Generations	The Australian government's policy of assimilation (1937-1973) aimed to remove all other cultures and languages practiced by Aboriginal and Torres Strait Islander peoples. This policy led to the forcible removal of many Aboriginal and Torres Strait Islander children from their parents to assimilate into Western society. The children who were removed from their families are known as the 'Stolen Generations'.
Transformative paradigm	A worldview that identifies that people's subjective realities are not only different, but that they are shaped by social, cultural, political, economic and racial/ethnic values. It stresses the importance of power in shaping a person's reality.
Western	In this study, Western refers to the worldview that is shaped by countries and cultures whose roots are connected to Europe through colonisation and influence.
Yarn	Yarning is a form of communication that involves conversation, either formally or informally, that focuses on the sharing of Indigenous knowledge, perspectives, and experiences. In this study, yarning is also a legitimate research method to collect data.

Abstract

Background: Women are at greater risk for poor oral health during pregnancy, which is linked to adverse birth outcomes and an increased risk of early childhood caries. In Australia, Aboriginal and Torres Strait Islander communities experience higher rates of adverse maternal and early childhood oral health outcomes compared to other Australians. The Midwifery Initiated Oral Health (MIOH) program, an integrated model of care capacity building midwives to promote oral health, was developed to address the oral health needs of pregnant women in Australia. Although the MIOH program was found to be effective in improving maternal oral health outcomes, it was not developed to address the needs of Aboriginal and Torres Strait Islander pregnant women, many of whom may prefer not to access mainstream antenatal services. Currently, there is limited knowledge on the oral health perspectives of Aboriginal and Torres Strait Islander women and Aboriginal health staff about maternal oral health. The underlying motivation of this PhD, therefore, was to adapt the MIOH model of care to capacity build Aboriginal health staff to deliver culturally appropriate oral health promotion to Aboriginal and Torres Strait Islander pregnant women. This study thus fills an important gap in the current literature, and is clinically important, as this intervention could lead to better outcomes for Aboriginal and Torres Strait Islander mothers and their children.

Purpose: The aim of this embedded sequential mixed-methods study was to develop and pilot test a culturally appropriate model of care (Grinnin' Up Mums & Bubs) in Greater Western Sydney, Australia, to promote oral health among Australian Aboriginal and Torres Strait Islander pregnant women by capacity building Aboriginal health staff. The specific objectives included exploring: (1) oral health knowledge, practices, attitudes, and challenges of Indigenous pregnant women globally; (2) the potential role of Indigenous health workers in promoting oral health among pregnant women worldwide; (3) perspectives of Aboriginal

health staff in promoting oral health among pregnant women; (4) Australian Aboriginal women's experiences and perceptions of oral health during pregnancy; and (5) to develop and pilot test the model of care.

Methods: Several data collection methods were used in this project, and were selected on their ability to address the proposed study objectives. Guided by Participatory Action Research, the Aboriginal health staff were supported by the research team to ensure that the study's aims, methods, and outcomes reflected the needs of a community in the Greater Western Sydney region. This thesis is presented as a series of five published papers. Papers 1 and 2 are presented as literature reviews exploring the existing evidence, while Papers 3 and 4 describe the findings from thematic analyses of data from two qualitative studies involving Aboriginal pregnant women and health staff. The findings from Papers 1 to 4 informed the development of the Grinnin' Up Mums & Bubs model of care. The fifth paper presents detailed information on the development of the model as well as findings from its mixed-methods, pre-post pilot testing with Aboriginal Health Workers.

Results: Paper 1 suggested that some Indigenous women across the globe have positive attitudes towards achieving good oral health care. However, there is a continued need for culturally safe and accessible dental services, and the involvement of care coordinators to promote oral health by supporting education and navigating access to dental care. Paper 2 highlighted the limited evidence on Indigenous Health Workers globally promoting maternal oral health, as most studies focused on other non-dental professionals and/or on oral health promotion during early childhood.

Paper 3 revealed insights from Aboriginal health staff (n=14) in Australia who believed that oral health promotion could be integrated into the role of Aboriginal Health Workers who provide antenatal support to Aboriginal and Torres Strait Islander women, as trust and rapport

are essential aspects to care. They also suggested that the knowledge and experiences of Aboriginal Health Workers could facilitate culturally safe oral health promotion.

In Paper 4, findings from interviews with Aboriginal women (n=12) in Australia also identified that oral health was a concern that was not always prioritised during pregnancy due to competing commitments. In a potential model of care, Aboriginal women were receptive to receiving information from health care providers they trusted and through a range of oral health promotion resources, if it was delivered as advice tailored to their needs. These findings also identified the need to improve accessibility to dental services.

Finally, Paper 5 details the development of the oral health model of care, Grinnin' Up Mums & Bubs, which consisted of a training program delivered as a face-to-face workshop, a suite of oral health promotion resources, and a culturally appropriate referral pathway to dental services. Findings from the pilot testing of the model conducted with Aboriginal Health Workers (n=7) showed a high level of satisfaction and improvement in oral health knowledge and confidence in promoting oral health among Aboriginal and Torres Strait Islander pregnant women. Recommendations for the model focused on improving strategies for yarning about oral health, the need for policy reform and widening the reach of the model of care.

Conclusion: The study findings provided valuable insight into the needs and processes for developing a culturally safe model of care to promote oral health among Aboriginal and Torres Strait Islander pregnant women in a Greater Western Sydney community in Australia. The role of Aboriginal antenatal health staff, particularly Aboriginal Health Workers, to promote maternal oral health is vital to an effective model of care, as trust is integral to the care delivered to clients. The findings from the pilot suggest that the model could be effective in capacity building Aboriginal Health Workers and influencing change in practice. Using an approach where the Aboriginal Health Workers could meaningfully drive the research resulted in a model

of care that was useful, relevant, culturally appropriate and built on the Aboriginal Health Workers' existing strengths. The initial findings from this research also highlight the need for further evaluation of the model of care to determine the impact on the oral health of Aboriginal and Torres Strait Islander pregnant women and the effectiveness of the model over time. Over the long term, there is also the need for changes in oral health policy to ensure that all Aboriginal and Torres Strait Islander women can access timely, affordable, and culturally safe dental care.

Chapter 1: Introduction

1.1 Terminology

Throughout the thesis various terminology have been used purposely to describe different populations, events and issues. One of the most important uses of terminology are when describing and distinguishing between Indigenous and Aboriginal and Torres Strait Islander peoples.

The terms Indigenous peoples, First Nations or First Peoples are used to refer collectively to all distinctive peoples around the world who identify as being descendants of the first peoples or custodians of a specific region, particularly prior to colonisation by another ethnic group. When referring to a singular group of peoples, however, this thesis will use a more descriptive term to reflect the diversity of Indigenous peoples across the globe.

Aboriginal and Torres Strait Islander peoples/Australians has been used to respectfully refer to the multitude of distinct peoples and nations who are recognised as the first peoples in Australia and are custodians to inhabit the land in Australia. In some instances, throughout the thesis, the word Aboriginal may be used to describe people who have clearly identified as Australian Aboriginal (such as in Paper 4 where none of the participants identified as Torres Strait Islander). Furthermore, Aboriginal health staff or Aboriginal Health Worker have been used to refer to health staff who identify as being Aboriginal and Torres Strait Islander. In this thesis, none of the Aboriginal health staff, who participated, identified as Torres Strait Islander (see Chapters 7 and 8).

Other terms that have been used throughout the thesis such as yarning and shame, which are words that have a specific meaning across Aboriginal and Torres Strait Islander cultures, will be prefaced with an explanation of the word. A glossary has also been included in the thesis to support the reader.

1.2 Study Context

This study arose from the needs identified by Aboriginal management staff in two sites across the Greater Western Sydney region in 2017. Both these services provided outreach antenatal and postnatal care to Aboriginal and Torres Strait Islander women through Aboriginal Health Workers (AHWs) and Family Partnership Workers (FPWs), who often partnered with nurses or midwives to ensure that clinical antenatal care would be delivered with appropriate cultural support. The Aboriginal management staff identified that while poor oral health was a concern among the services' clients, it was necessary for the candidate to yarn directly with the AHWs and FPWs to determine whether this was also a concern from their perspective, and what should be done. The candidate, a non-Indigenous person, needed to take an approach where the Aboriginal health staff could meaningfully inform and be engaged in the research, resulting in a net benefit for both the staff and clients, without a disproportionate burden. The methodology used by the candidate (see Chapters 4 and 5) facilitated the involvement of the Aboriginal health staff throughout the study so that they could influence how the research would be conducted as well as the benefits that would be achieved at the end.

The name of the model of care, Grinnin' Up Mums & Bubs, was created midway through the project during a meeting where the Aboriginal health staff were yarning about the components of the model of care. The term, *Grinnin' Up*, referred to the aim of the research to improve oral health and the smiles of Aboriginal and Torres Strait Islander pregnant women. The inclusion of *Mums & Bubs* indicated that good oral health during pregnancy was important to benefit both the mother and the child.

1.3 Candidate Positioning

The candidate identifies as a non-Indigenous Australian woman with a South-East Asian ethnic background, which had a significant impact on the decisions made about the research process. The candidate had previous experience working with minority populations and in public oral health research; however, this was the first time that she was the lead on a research project that focused exclusively on Aboriginal and Torres Strait Islander communities. As part of the health services' guidelines for working with Aboriginal and Torres Strait Islander communities, the candidate completed cultural safety training and attended various other workshops facilitated by Australian Aboriginal scholars on conducting research with Aboriginal and Torres Strait Islander communities. To build rapport, the candidate yarned about the project objectives and methods with the Aboriginal health staff at the study sites, and also participated in community events alongside the Aboriginal health staff. The candidate also yarned with other Aboriginal and Torres Strait Islander stakeholders and organisations about the project and recommended ways of conducting research based on their cultural expertise and experience. Finally, the candidate sought to have Aboriginal and Torres Strait Islander supervisors in addition to her non-Indigenous supervisors to guide the specific details of the research process. These included refining the thematic framework, reviewing the language used throughout manuscripts, discussion in decision making before contacting Aboriginal and Torres Strait Islander stakeholders, and guidance on following cultural protocols, which helped ensure that a cultural lens could be maintained throughout the research.

1.4 Research Aims

The aim of this study was to develop and pilot test an evidence-based and culturally appropriate model of care to promote oral health among Australian Aboriginal and Torres Strait Islander pregnant women by capacity building Aboriginal health staff. The specific research objectives were to:

1. Gather evidence relating to oral health knowledge, practices, attitudes, and challenges of Indigenous pregnant women globally (Chapter 2)
2. Gather evidence on the potential role of Aboriginal and other Indigenous health workers in promoting oral health among pregnant women worldwide (Chapter 3)
3. Explore the perspectives of Aboriginal health staff in promoting oral health among pregnant women and gain their insights into the development of a culturally safe antenatal oral health model of care (Chapter 7)
4. Investigate Australian Aboriginal and Torres Strait Islander women's experiences and perceptions of oral health during pregnancy to inform the development of a culturally safe antenatal oral health model of care (Chapter 8)
5. Develop and pilot test a culturally safe antenatal oral health model of care, specifically for Aboriginal women during pregnancy (Chapter 9).

1.5 Structure of the Thesis

This thesis will follow a series of chapters that will incorporate publications relating to the study. An overview of the thesis structure has been illustrated in Figure 1.

Chapter 1 provides an introduction of the thesis and a brief overview of the context underpinning the research.

Chapter 2 discusses the rationale and background for the research by exploring the history of the health and wellbeing of Aboriginal and Torres Strait Islander Australians and

maternal oral health. The latter half of this chapter presents the first publication (Paper 1) for the Grinnin' Up Mums & Bubs study, published in *Women and Birth*. Paper 1 was a mixed-methods systematic review exploring the oral health knowledge, attitudes, practices, and challenges experienced by Indigenous pregnant women globally.

Chapter 3 is a continuation of the background described in Chapter 2, but further explores the guidelines and strategies that have been developed to improve maternal oral health. This chapter concludes with the second publication (Paper 2) for the thesis, published in *BMC Public Health*. This publication is a scoping review investigating the potential role of Indigenous health workers worldwide to promote oral health during pregnancy, as well as identifying any developed training programs or screening tools to assist with antenatal oral health promotion.

Chapter 4 is an overview of the research gaps, aims, questions and outline of the thesis. This chapter will also describe the study's conceptual framework.

Chapter 5 provides an in-depth discussion around the chosen methodology underpinning this research, particularly around the paradigm utilised for the study.

Chapter 6 details the study design and the rationale behind the methods for the research. This chapter outlines the different phases, components of each phase, and how a participatory action research approach was integrated. Information on how the methods were adjusted to ensure cultural safety while following restrictions relating to the Coronavirus-2019 (COVID-19) pandemic is also included in this chapter.

Chapter 7, the first of three results chapters, reports on Phase 1A of the study: the qualitative findings of the perspectives of Aboriginal health staff about promoting oral health among Aboriginal and Torres Strait Islander women (Paper 3). These findings have been published in the peer-reviewed journal, the *International Journal for Equity in Health.*

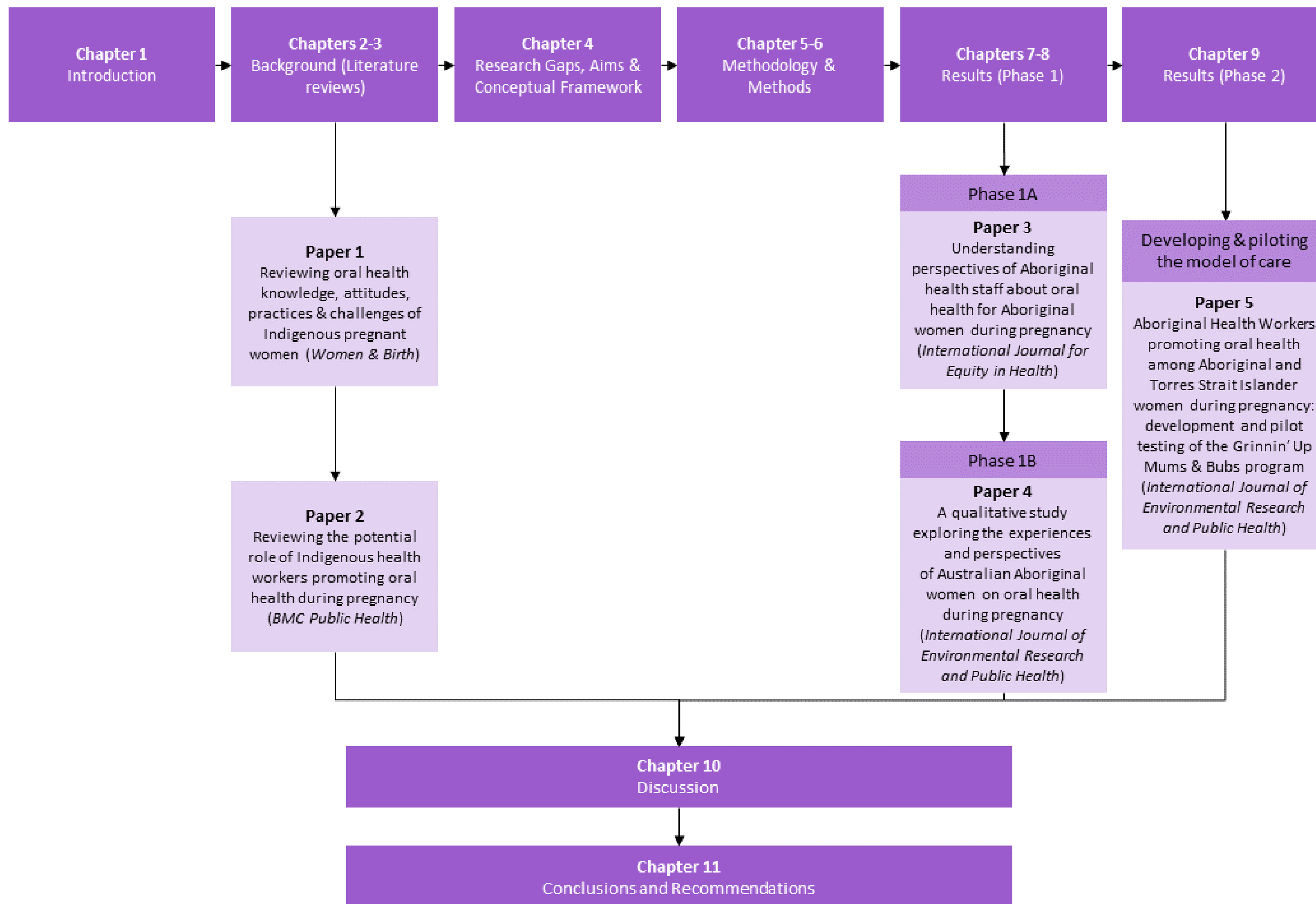
Chapter 8 reports on Phase 1B of the study: the qualitative findings of the perspectives of Australian Aboriginal women about oral health during pregnancy (Paper 4). These findings have been published in the *International Journal of Environmental Research and Public Health.*

Chapter 9 is the third results chapter and presents Phase 2 of the study. This chapter discusses how the findings from previous chapters have informed the development of the antenatal oral health model of care for Aboriginal and Torres Strait Islander women during pregnancy. The findings from the pilot test of the program with AHWs is also published, as Paper 5, in the *International Journal of Environmental Research and Public Health*.

Chapter 10 presents a comprehensive discussion of the major findings from this study. It also integrates the findings and implications of the study considering recent literature that has been published. This chapter also discusses the strengths and limitations of the study.

Chapter 11 provides the conclusion, recommendations, and areas for future research for Aboriginal health staff promoting oral health among Aboriginal and Torres Strait Islander women during pregnancy.

***Figure 1** Thesis Outline*



Chapter 2: Background (Part 1)

2.1 Overview

The following two chapters (Chapters 2 and 3) will provide an overview of the relevant literature, which will form the argument for the research aims and questions outlined in Chapter 4. The first half of the literature review (Chapter 2) will offer a historical context, argue the importance of oral health during pregnancy, and will culminate in a published review article on the knowledge, attitudes, behaviours, and challenges relating to oral health that face Indigenous pregnant women worldwide.

2.2 Understanding the History of Health and Wellbeing of Aboriginal and Torres Strait Islander Peoples

Health for Aboriginal and Torres Strait Islander Australians draws on a holistic concept of wellbeing, and includes interconnected dimensions such as social, emotional, physical, cultural and spiritual wellbeing.[2] The emphasis on health, however, is on the complete wellbeing of the community as a whole rather than just the individual.[3] Health for Aboriginal and Torres Strait Islander Australians also needs to be considered within the context of a worldview of connectedness.[4] Aboriginal health and wellbeing may also be viewed as the interconnection between the 'self' to the body; to mind and emotions; to family and kinship; to community; to culture; to Country; to spirit, spirituality and ancestors.[5] Thus, health for Aboriginal and Torres Strait Islander Australians extends beyond the definition of health provided by the World Health Organization, the "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p. 1).[6]

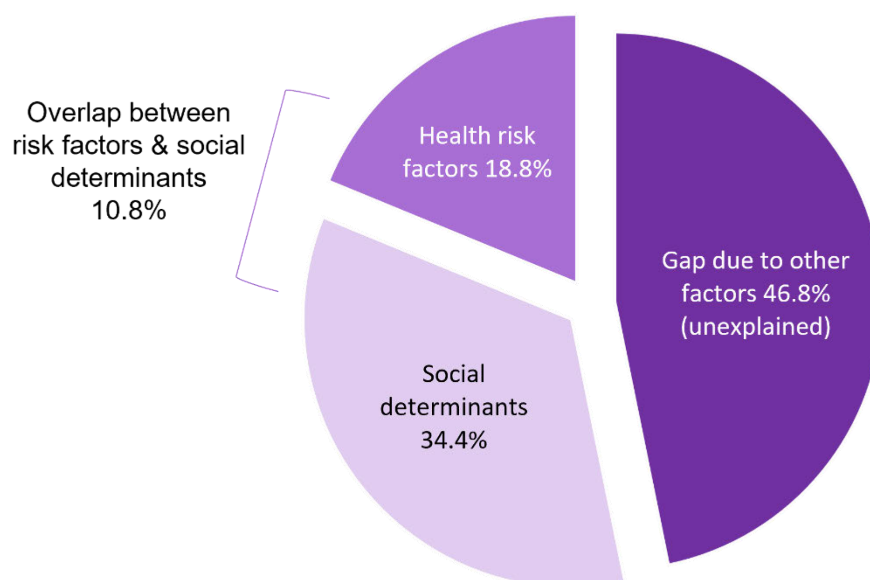
Aboriginal health and wellbeing is also influenced by cultural determinants.[5] These cultural determinants include individual and collective rights, self-determination and strong leadership within the community, sharing Aboriginal and Torres Strait Islander beliefs and knowledge, promoting cultural expression and connecting to Country.[5] Butler et al. [7]

identified that autonomy, agency, as well as community and individual self-determination are important to wellbeing. Connections with family, kinship and community are also essential to developing social capital and building resilience.[7, 8] Yet being connected to Country is special for many Aboriginal and Torres Strait Islander peoples, as it can be a key driver to cultivating a strong cultural identity, spirituality and empowerment.[7] These determinants build resilience among individuals and communities, which is a powerful quality for better health outcomes.[9] Thus, this need for connection with a person's self to family, kinship, community, culture and country are key aspects of wellbeing. Unfortunately, both historical factors and social determinants have bereaved many Aboriginal and Torres Strait Islander Australians of this right to health.

Australia boasts one of the highest life expectancies in the world,[10] which is underpinned by a strong healthcare system. Although many people benefit from Australia's healthcare system, there are major gaps in access and equity across the board, especially for Aboriginal and Torres Strait Islander Australians.[11] There continues to be a significant health disparity between Aboriginal and Torres Strait Islander Australians compared to non-Indigenous Australians. In 2015-17, the life expectancy at birth was 71.6 years for Aboriginal and Torres Strait Islander males and 75.6 years for Aboriginal and Torres Strait Islander females, which was 8.6 years and 7.8 years lower than other Australians, respectively.[12] These statistics reflect a high burden of disease experienced by Aboriginal and Torres Strait Islander peoples, particularly chronic disease, at 2.3 times the burden of non-Indigenous peoples.[13] The gross health discrepancies within Australia's population highlights the significant inequality in healthcare within Australia.[11]

Analyses from national survey data reveal that more than half of the health gap (Figure 2) between Aboriginal and Torres Strait Islander Australians and non-Indigenous Australians is explained by 11 factors.[1] These 11 factors may be broadly categorised into two groups: 1) social determinants (five factors) which explained about a third (34.4%) of the health gap; and 2) health risk factors (six factors) which contributed to about a fifth (18.8%) of the health gap. From these 11 factors, five accounted for almost all (98%) of the explained health gap. Three of the five factors were related to social determinants (employment and hours worked, level of school completed and household income), and two related to health risk factors (smoking and overweight/obesity status based on body mass index).Unsurprisingly, this analysis also revealed that there was about an 11% overlap between these factors, likely due to the complex interaction between social determinants and health risk factors.

Figure 2 *Proportion of the Adjusted Health Gap Explained by Differences in Social Determinants and Health Risk Factors Between Indigenous and non-Indigenous Australians, 2011-13 (Adapted from Australian Institute of Health and Welfare [1])*



Yet almost half of the health gap (46.8%) between Aboriginal and Torres Strait Islander Australians and non-Indigenous Australians is not explained by these 11 factors.[1] As the national survey data were collected at a single point in time, it may not explain the

lifelong effects of health at early life or social determinants of health that may affect some of the Aboriginal and Torres Strait Islander population at other points in time. These 11 factors also do not include behaviours such as access to health services, which can have a profound impact on health. One of the unexplained variables that may not be explained by this health gap is the effect of historical determinants on Aboriginal and Torres Strait Islander Australians.[5]

Significant health inequalities between Indigenous and non-Indigenous populations are present in other high income countries like New Zealand, Canada and the United States.[14, 15] Historical factors have significantly contributed to the gap in health outcomes for Indigenous peoples.[16] A common denominator between these countries is the impact of Imperialist philosophies, which resulted in European explorers invading and colonising other lands for economic, political and religious expansion.[17] The underpinning philosophies of these European explorers embodied ethnocentrism, the belief that the colonial culture or way of life was the best way.[18] These philosophies justified the colonisation of First Nations peoples and the lands they inhabited.[18, 19] Ethnocentrism also fostered various myths about Indigenous peoples. One myth was that Indigenous peoples have a limited capacity for important aspects of wellbeing such as self-determination and sovereignty.[18, 19] Such views provided European countries a reason to invade and occupy lands inhabited by Indigenous peoples.[19]

In Australia, this invasion was followed by a violent history of governments implementing strategies to eradicate Aboriginal and Torres Strait Islander peoples through policies of protectionism, segregation and assimilation.[20] These policies led to the widespread forcible removal of many Aboriginal and Torres Strait Islander children from their families and communities into institutions and foster homes, where many children experienced sexual, physical and emotional abuse.[21] The children who were forcibly removed are known as the

Stolen Generations.[21] The subsequent widespread loss of identity, culture, language, family, kinship and community, alongside experiences of abuse among the Stolen Generations, has culminated into ongoing intergenerational trauma among many Aboriginal and Torres Strait Islander peoples.[21] These facts have been highlighted to demonstrate the profound effect that these events have had on the health and wellbeing of Aboriginal and Torres Strait Islander Australians today.

2.3 Working to Close the Gap

In response to the significant health inequalities experienced by Aboriginal and Torres Strait Islander Australians, the Council of Australian Governments (COAG) implemented the Closing the Gap Strategy in 2008.[22] This strategy aimed to achieve equality in life expectancy within a generation[22] in addition to setting the following targets:

- Halve the gap in mortality rates of Aboriginal and Torres Strait Islander children under five within a decade.
- Ensure all Aboriginal and Torres Strait Islander four-year-old children in remote communities have access to early childhood education within five years.
- Halve the gap for Aboriginal and Torres Strait Islander students in reading, writing and numeracy within a decade.
- Halve the gap for Aboriginal and Torres Strait Islander people aged 20-24 in Year 12 attainment or equivalent attainment rates by 2020.
- Halve the gap in employment outcomes between Aboriginal and Torres Strait Islander and non-Indigenous Australians within a decade.

Yet, within ten years of being implemented, a non-government report by the Close the Gap Campaign Steering Committee[23] found that this gap was widening, not closing. The Closing the Gap Statement of Intent, a statement signed by the COAG and Aboriginal and

Torres Strait Islander peoples alongside the implementation of the Closing the Gap Strategy, highlighted that life expectancy inequality was determined by perpetuating structural factors.[24] These factors included ongoing institutional racism, social determinants, lack of appropriate housing, and access to culturally safe primary health care services.[24]

A ten-year review of the Closing the Gap Strategy by the Close the Gap Campaign Steering Committee highlighted the COAG was not on track to meet its set target of achieving life expectancy equality because it had "only been partially and incoherently implemented"[23] (p. 4) and that it was "effectively abandoned after five years"[23] (p. 4). One of the Committee's recommendations moving forward was continued funding towards areas that were already targeted. These areas included maternal and infant health and chronic disease, as well as a focus on building on primary health services with a shift towards sustainable preventive interventions.[23]

Since the release of the 2018 review, a landmark partnership agreement has been signed by all levels of government and the Coalition of Aboriginal and Torres Strait Islander Peak Organisations to work together in genuine partnership.[25] This partnership would allow Aboriginal and Torres Strait Islander communities to set their own priorities and targets, and to ensure that policies and programs would meet their needs. One of these targets, which was to halve the gap in child mortality rates by 2018, has seen small improvements in maternal and infant health indicators. Unfortunately, however, these improvements have not translated into a reduced gap in child mortality outcomes.[25] Thus, more maternal and infant research in this area is needed. The following section will explore the relevance of maternal and infant oral health to Aboriginal and Torres Strait Islander women and children.

2.4 Maternal and Infant Health

2.4.1 The Importance of an Early Head Start

One of the factors that influence whether a child is able to reach their full potential for health is the mother's health at preconception.[26] Evidence demonstrates that the mother's health and wellbeing continues to impact the child's health throughout pregnancy and delivery, and into the child's first 2000 days.[26-28] In Australia, Aboriginal and Torres Strait Islander women represented 4.5% of women who gave birth in 2017.[29] Yet, Aboriginal and Torres Strait Islander women were four times as likely to have pre-existing type 2 diabetes compared to non-Indigenous women.[29] Infants born to Aboriginal and Torres Strait Islander mothers were 1.6 and 1.8 times more likely to be born pre-term (before 37 weeks gestation) and of low birth weight (under 2500 grams), respectively[29] compared to non-Indigenous infants. Birth outcomes are significant since both pre-term birth and low birth weight are risk factors for infant morbidity and mortality, as well as developmental difficulties such as poor cognitive skills and motor control.[30, 31]

2.4.2 Maternal Oral Health

Although typically overlooked, maternal oral health is a common risk factor for both infant and maternal health outcomes. Studies in both Australia and France have found that 40-50% of pregnant women experience dental caries (decay).[32, 33] Dental caries is an oral bacterial disease that involves the destruction of the dental tissue through demineralisation.[34] Fermentable carbohydrates, which are sugars that are easily fermented in the digestive tract, are metabolised by oral bacteria, which then increase the acidity in the mouth and increase demineralisation.[35] Moreover, the bacteria that colonise the oral cavity may form plaque, which is a biofilm that may contribute to caries development.[36] Dental caries is the most prevalent non-communicable health condition in the world.[37] Despite the implementation of

relatively cost-effective public oral health interventions, such as fluoridation of water supply and encouraging smoking cessation,[38] incidence of dental caries continues to remain ubiquitous.[39] The progression of dental caries is cumulative; damage to dental tissue is life-long and irreversible.[40] Thus, reducing the risk factors that contribute to the incidence and severity of dental caries early in life could play a significant role in reducing dental caries in adulthood. A key factor that could impact on the child's oral health is maternal oral health and behaviours, beginning from gestation.

During pregnancy, there is a reduced potential for remineralisation of tooth enamel due to lower calcium and phosphate concentrations in saliva.[41, 42] With a lower capacity for remineralisation, this may increase the likelihood of developing dental decay among expectant mothers.[35, 42] Increased acidity associated with frequent vomiting can deteriorate the enamel of a person's teeth and contribute to caries development.[35, 43] In addition, dietary changes including increased cravings, consumption of sugar,[35] and increased vomiting could place pregnant women at further risk of dental decay due to its impact on enamel erosion[44] as well as periodontal disease.[45]

Pregnancy embodies significant physiological change as fluctuations in progesterone and oestrogen can profoundly affect the cardiovascular system, blood volume levels, immunity, respiratory system, liver function, renal function, gastrointestinal system and acid-base regulation.[46] Although not well understood, these fluctuations are linked to increased vascularity, either directly or indirectly, around the gingiva (gums), which may lead to gingivitis or periodontal disease.[35] Gingivitis is a common oral health problem among pregnant women[45, 47, 48] that affects between 11-72% of expectant mothers.[49, 50] It refers to the inflammation of the gums resulting from plaque formation on the teeth.[51, 52] Untreated, gingivitis can progress to periodontal disease where the gingiva, and dental-supporting

connective tissue and bone may be damaged.[53] Moreover, periodontal disease may contribute to systemic infections and certain diseases.[53]

Poor maternal oral health is one product resulting from an interplay of complex social determinants, including lower levels of education, socioeconomic status, area of residence and employment.[54, 55] Poor oral health is further exacerbated among pregnant women with diabetes, as higher blood sugar levels can create an oral environment for bacteria to thrive and reduces the body's ability to defend itself from infection.[56] Moreover, poor oral health combined with diabetes is concerning due to the associated increased risk of poor periodontal health when there is suboptimal glycaemic control,[57] which can contribute to adverse birth and maternal outcomes.[58, 59] The following section will further unpack the impact of poor maternal oral health on mothers and their offspring.

2.4.3 Impact of Poor Oral Health During Pregnancy

Systematic reviews have found that periodontal disease is associated with preterm birth, low birth weight and preeclampsia.[60, 61] Although preterm birth and low birth weight can affect the child's growth and development, preeclampsia is a life-threatening condition characterised by high blood pressure during gestation and signs of damage to the mother's liver, kidneys or brain.[62] Periodontal disease also has a bidirectional relationship with glycaemic control, which can contribute to diabetes complications.[56] While periodontal disease can lead to pain, discomfort and functional limitations, dental decay can also have a significant impact.[63] Untreated dental decay can be painful and result in dental infections; moreover, dental infections have been identified as an aetiological factor for preterm birth.[64] Maternal dental decay can also contribute to early childhood caries (ECC), especially if mothers engage in certain feeding practices after birth like sharing the same spoon, pre-chewing food or cleaning pacifiers with their saliva all of which can result in bacteria transmission to the child.[65] Going to sleep with a bottle containing a sweetened drink,

inappropriate tooth-brushing practices and excessive and frequent consumption of carbohydrates can further increase risk of ECC.[66]

Early childhood caries is the most common chronic childhood disease worldwide and affects various aspects of the child's functioning and quality of life. Even in Australia, where there is a universal health care scheme subsidising health care costs under Medicare, 42% of children have experienced decay in their deciduous teeth.[67] Australian Aboriginal and Torres Strait Islander children have a greater risk of severe ECC, and experience 1.7 times more hospitalisations due to dental-related problems than non-Indigenous children.[39] Severe ECC is concerning, as it is a predictor for poor oral health in later childhood, and even as an adult.[68] A recent study on the risk factors for ECC in one Aboriginal and Torres Strait Islander cohort found that poverty had a significant impact on oral health outcomes of children.[69] Poverty has both a direct and indirect impact on ECC. Australian epidemiological data has shown that ECC is consistently higher in households where parents have a lower income and less education.[70] In addition to addressing the complex social determinants of ECC in early childhood, it is important to explore some of the barriers that prevent women from having good oral health during pregnancy.

2.4.4 Barriers to Maintaining Maternal Oral Health

Although most pregnant women globally engage in some positive oral health practices, the literature also reveals that many women continue to experience oral health problems during pregnancy.[71-75] These problems include broken teeth, apparent dental decay, signs of gingivitis and dental pain.[71-75] Tooth brushing is a common oral health behaviour among pregnant women with over 70-90% of pregnant women globally reporting to have brushed their teeth at least once a day.[71-74] In one Australian study, while at least 60% of pregnant women had an oral health problem in the previous year, only 12% had accessed dental services.[74] For many pregnant women, experiencing oral health problems does not

necessarily equate to having appropriate access to dental services. In Sydney, a large urban city in New South Wales (NSW), Australia, only 30.5% of pregnant women reported seeing a dentist in the last six months in one study, even though 54% had at least one oral health problem.[32] Some of the main barriers to dental services that have been cited include a lack of awareness about oral health care during pregnancy, dental costs, and poor knowledge about subsidised dental services.[32, 72] The following sub-sections will further explore these barriers.

2.4.4.1 Awareness About Oral Health Among Pregnant Women

Studies have found that while some pregnant women have basic dental knowledge, such as the association of sugar intake with dental caries,[76] there are still significant gaps in knowledge relating to periodontal disease[74] and the impact of poor maternal oral health on pregnancy and infant outcomes.[32] Thomas et al. [74] identified that Australian mothers of newborns were aware that sweetened foods increased the risk of dental decay; however, 82% of mothers did not know, and were not informed, about the importance and impact of periodontal disease. In another Australian study, less than 50% of the pregnant women surveyed were aware that dental decay-causing bacteria could be transmitted from the mother to the baby.[32]

Globally, some pregnant women have misconceptions about the safety of certain oral health interventions, including prophylactic treatment, to the health of the unborn baby.[75, 76] Detman et al. [77] reported that pregnant women were concerned about the use of dental x-rays, and potential adverse effects from taking medication to manage dental pain, on their child. In the study by Boggess et al. [76], approximately 60% of pregnant women believed that poor oral health during pregnancy was not unusual, and that it was normal for women to lose their teeth during gestation. These findings suggest that some women may still believe ubiquitous pregnancy myths, for example, that it is normal to lose a tooth for a baby or that calcium is drawn out of the mother's teeth by the baby during gestation.[78]

2.4.4.2 Awareness About Oral Health Among Health Care Providers

Contributing to the lack of oral health awareness and misconceptions among pregnant women is the misleading and often inconsistent information around dental care received from family, friends, doctors and other healthcare providers.[77] Although antenatal care providers, including general practitioners (GPs), obstetricians/gynaecologists and midwives, believed that oral health during pregnancy was important, few felt that they were suitably trained to provide oral health advice.[79] More concerning, however, were the misconceptions shared by antenatal care providers and dentists about safety of dental care during pregnancy. Many GPs believed that dental treatment would be unsafe for pregnant women.[80]

In addition, some Australian studies have found that many dentists hesitate to treat pregnant women.[80, 81] One such study reported that 95.7% of dentists wanted more information about oral health during pregnancy.[81] Dentists were twice as likely to advise delaying dental treatment until after delivery if they appeared to have a lack of knowledge about the risks involved with treating pregnant women.[81] The lack of awareness among health care providers further highlights the need to improve oral health knowledge, clarify misconceptions, and improve access to dental services during pregnancy.

2.4.4.3 Cost to Access Dental Care

Another major barrier to good oral health during pregnancy is the cost of dental treatment.[82] The economic burden of dental care has been reported across both developing and developed countries.[82, 83] In some developing countries, residents are faced with costly dental care as well as limited availability of dental services due to dental workforce shortages.[84] Yet even in Australia, a country with relatively higher prosperity, about a third of adults continue to experience untreated dental decay.[39] This is unsurprising, as oral diseases disproportionately affect lower socioeconomic groups, many of whom may also be less likely to access dental treatment.[85]

2.4.4.4 Limited Eligibility to Public Dental Services

The cost of health care for Australians is completely or partially subsidised by the government through the national health insurance scheme, Medicare.[86] Medicare is funded through an income levy, and may subsidise the cost of some medicines; GP or specialist consultations; tests and scans; as well as some surgeries and procedures conducted by doctors and eye tests conducted by optometrists.[86] Although there is some universal dental coverage in Australia, the eligibility criteria to receive subsidised dental services vary between states. To access public dental services in NSW (the largest state in Australia), adults need to be eligible for Medicare and have a government-issued concession card. This concession card may be either a Health Care Card; Pensioner Concession Card; or a Commonwealth Seniors Health Card.[87] People who receive a government benefit payment will automatically receive the concession card. All children (below 18 years of age) who reside in the state are eligible to access free dental care at any public dental service. For families who receive a government benefit payment, the Medicare Child Dental Benefits Scheme (CDBS) provides eligible children up to AUD $1013, over two years, to offset the fees for basic dental care at a private dental clinic.[88] Currently, there are no additional provisions for all women to access dental services during pregnancy in NSW.

Most Australians are ineligible to access public dental services, and primarily access treatment through private dental services. While many adults who are ineligible to access public dental services can comfortably pay for private oral health care, there are some who still cannot afford private dental care. According to an Australian national survey, about a third (32%) of people avoided or delayed visiting the dentist due to cost.[39] Rates of avoidance or delaying a visit were highest among the lowest annual household income group (41%).[39] The survey found that over a quarter (28%) of Australian adults reported that they would have difficulty paying for prophylactic dental treatment (approximately AUD $200).

Moreover, difficulty with paying for preventive dental care was much higher among those who did not have private health insurance (40%) compared to those that did (17%). These clear inequalities highlight the need to identify specific population groups that may not have the same opportunity to access dental care. The following section will explore additional barriers to oral health care and needs of Indigenous women during pregnancy across the globe.

2.4.5 Additional Barriers for Indigenous Women During Pregnancy

Indigenous pregnant women across the world may experience unique barriers to seeking dental care and engaging in recommended oral health behaviours compared to non-Indigenous women. The following manuscript, Paper 1, provides a comprehensive synthesis of current evidence in this area relating to Indigenous pregnant women worldwide. The historical experiences of Indigenous peoples in countries other than Australia, like Canada and New Zealand, have some striking similarities with Aboriginal and Torres Strait Islander Australians. Thus, exploring the barriers to dental care for Indigenous pregnant women through an international lens may provide additional insight into the challenges experienced by Australian Aboriginal and Torres Strait Islander pregnant women.

2.6 Citation: Paper 1

Kong AC, Ramjan L, Sousa MS, Gwynne K, Goulding J, Jones N, Srinivas R, Rambaldini B, Moir R, George A. The oral health of Indigenous pregnant women: a mixed-methods systematic review. Women and Birth. 2020;33(4):311-22. doi: 10.1016/j.wombi.2019.08.007

2.7 Aim: Paper 1

The aim of this systematic review was to identify quantitative and qualitative evidence on the oral health knowledge, practices and attitudes of Indigenous pregnant women

and women who were pregnant with an Indigenous child globally, and to examine the oral health challenges faced by this population.

2.8 Conclusion: Paper 1

The findings from the systematic review suggest that oral health was a concern for Indigenous pregnant women across Australia, New Zealand, Canada, and the United States. Although there was a paucity in evidence around oral health knowledge among Indigenous women during pregnancy, there appeared to be some misconceptions, highlighting the need for further oral health education and promotion. Many women across these studies reported positive oral health behaviours, particularly toothbrushing, but also the need to access dental services. Despite the need for dental services during pregnancy, whether Indigenous women were able to access services depended on the health care model within the country or local area, as well as psychosocial and socioeconomic factors. These contextual factors that create barriers indicate that there is a need for changes in policy to improve accessibility to dental care. This gap in access further demonstrates the need to increase the availability of culturally safe and community-tailored dental services. As education through handouts were perceived as insufficient, this review identified the need for more effective forms of health promotion such as through a care coordinator or an Indigenous Health Worker to assist women to navigate the service.

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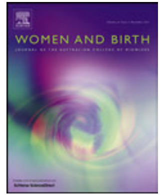
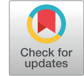


The oral health of Indigenous pregnant women: A mixed-methods systematic review



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ABSTRACT

Background: Western models of care to improve the oral health of pregnant women have been successfully implemented in the healthcare setting across various developed countries. Even though Indigenous women experience poorer pregnancy and birth outcomes compared to other women, these models have not been developed with Indigenous communities to address the oral health needs of Indigenous pregnant women. This review aimed to understand the oral health knowledge, practices, attitudes and challenges of Indigenous pregnant women globally.
Methods: A comprehensive search including six electronic databases and grey literature up to September 2018 was undertaken (PROSPERO Registration Number: 111402). Quantitative and qualitative evidence exploring at least one of the four oral health domains relating to Indigenous pregnant women worldwide, including women pregnant with an Indigenous child, were retrieved.
Results: Eleven publications related to nine studies were included. Indigenous pregnant women's attitudes, practices and challenges relating to their oral health were influenced by socioeconomic and psychosocial factors, and their healthcare context. Availability of dental services varied depending on the healthcare model, whether services were public or private, and whether services met their needs. Although there was little evidence related to oral health knowledge, the literature suggests some misconceptions within this population.
Conclusions: The availability of culturally appropriate dental services that fulfilled the needs of Indigenous pregnant women varied between developed countries. This review highlighted the need for community-tailored dental services and a care coordinator to provide both education and assistance to those navigating services.
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Statement of significance

Problem
Indigenous pregnant women continue to experience poorer pregnancy and birth outcomes compared to other women. One factor contributing to this may be poor oral health during pregnancy.
What is already known
While western models of care have been successfully implemented to improve the oral health of pregnant women, they do not adequately address the needs of Indigenous women.

Abbreviations: JBI, Joanna Briggs Institute; OR, odds ratio; PROSPERO, Prospective Register of Systematic Reviews; TTM, trans-theoretical model.

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What this paper adds
To create culturally appropriate dental care requires consideration of the contextual and psychosocial factors affecting access and attitudes to services. There is also a need for community-tailored dental services and a care coordinator to navigate services.

1. Introduction

A key problem underlying the disparities in health outcomes between Indigenous and non-Indigenous peoples globally is the implementation of policies and programs without adequate consultation with local Indigenous communities.[1] Due to historical injustice and intergenerational distrust, conducting research to improve health outcomes *in*, rather than *with*, these communities will likely perpetuate existing health inequalities.[4] Ironically, one Aboriginal and Torres Strait Islander community felt they were "the most researched people in the world" (p. 12).[2] Updated guidelines and strategic reports have identified the need for collaborative, community-based participatory Indigenous health research to capacity build the health workforce and improving long term health outcomes.[3] In this review, the word *Indigenous* will be used inclusively to describe peoples who identify as First Peoples or First Nations globally. Names of specific groups will be used when identifying a distinctive cultural group.

Globally, Indigenous health workers are invaluable in improving health outcomes of patients because they are more likely to demonstrate greater levels of cultural competence. Their holistic understanding of patients' concerns and the priorities of non-Indigenous health professionals fosters effective communication, thus bridging the gap and ensuring that care is delivered in a culturally appropriate manner.[4] Indigenous health workers can play a pivotal role in maternal oral health since they are well-placed to manage the oral health of pregnant women and have demonstrated providing similar care in other populations, including children.[4]

Poor maternal oral health is associated with increased risk of adverse birth outcomes.[5] Current antenatal guidelines recommend that all women are educated about their oral health during pregnancy, assessed and provided appropriate dental referrals.[6] This is important as few pregnant women seek dental care due to various barriers including poor oral health awareness and dental costs.[7,8] Some women also have misconceptions, often shaped by the beliefs of family, friends and even healthcare providers,[7,8] about the safety of dental procedures during pregnancy.

Indigenous pregnant women may experience additional barriers to seeking dental care. In countries like the United States and Australia where antenatal oral health programs have been implemented within a Westernised healthcare model,[7,9] they may perpetuate systemic discrimination as they may not consider the cultural and social factors that affect Indigenous women. Indigenous women globally continue to experience poorer pregnancy and birth outcomes compared to non-Indigenous mothers.[10] While Indigenous women highly value good health, programs need to be developed with community to create culturally appropriate interventions.[3] Although oral health knowledge has been explored among non-Indigenous pregnant women,[11] there is currently a lack of evidence that synthesises the oral health knowledge, attitudes, practices and specific challenges that affect Indigenous pregnant women worldwide. Gathering such information is important as it will provide valuable insight into additional needs of Indigenous communities and inform the development of alternative models of care involving Indigenous health workers.

2. Aims

This systematic review aimed to identify quantitative and qualitative evidence on the oral health knowledge, practices and attitudes of Indigenous pregnant women and women who were pregnant with an Indigenous child globally, and to examine the oral health challenges faced by this population.

3. Research question

This review aimed to answer the specific question: what constitutes the oral health knowledge, practices, attitudes and challenges of Indigenous pregnant women and non-Indigenous women who are pregnant with an Indigenous child globally?

4. Methods

4.1. Design

Reporting for this mixed-methods systematic review followed the Joanna Briggs Institute Guidelines for Systematic Review Report Writing.[12] The review adopted a data-based convergent integrated approach to simultaneously combine qualitative and quantitative data. The protocol for this mixed methods systematic review has been registered with the International Prospective Register of Systematic Reviews (PROSPERO) (Record ID 111402).

4.2. Eligibility criteria

4.2.1. Types of studies

Articles that reported on quantitative and/or qualitative outcomes relating to the oral health of Indigenous pregnant women and non-Indigenous women pregnant with an Indigenous child were considered. Since this review aimed to identify current knowledge, attitudes, practices and challenges, cross-sectional studies and qualitative studies (interviews and focus groups) were included.

4.2.2. Types of participants and setting

Articles were considered if the majority of participants (>50%) were women who identified as being Indigenous and pregnant, or had very recently given birth and were reporting on their pregnancy retrospectively. Indigenous peoples are peoples who identify as being part of a distinct community that inhabited a geographical region prior to colonisation.[13] Since some Indigenous antenatal services may also provide care to non-Indigenous women, pregnant with an Indigenous child, studies that recruited these women were included. No limitations were placed on the participants' country of residence.

4.2.3. Types of phenomena of interest

4.2.3.1. Inclusion criteria. The review considered the phenomena of interest to be the oral health knowledge, attitudes, practices and challenges of Indigenous pregnant women or non-Indigenous women pregnant with an Indigenous child.

4.2.3.2. Types of outcomes. Articles were considered if they reported on the views of women who were pregnant with an Indigenous child in relation to the four oral health domains of interest (knowledge, attitudes, practices and challenges/barriers). These domains correspond to the ubiquitous KAPB (knowledge, attitudes, practices, behaviours) model to help identify the social behaviours and needs of Indigenous pregnant women, and help shape future oral health programs.[14]

4.2.3.3. Exclusion criteria. Articles were excluded if they were not related to pregnant women or did not separate the analysis for oral health outcomes of Indigenous women from other women. They were also excluded if the outcomes were not empirical forms of evidence, including discussion papers, literature reviews, commentaries, letters and editorials. Conference abstracts and articles that were not available in the English language were also excluded.

4.3. Searches

Searches were conducted across six databases (Ovid MEDLINE, CINAHL, Scopus, ProQuest Central, PubMed, Embase). Grey literature was searched in institutional repositories and on the Internet, including Google Scholar and Google. To identify other studies, reference lists and cited references of selected key articles were hand-searched. All articles that addressed the study question, published up to September 2018, were considered for inclusion.

Search strategies were developed for each database using Boolean operators, truncations and Medical Subject Headings, adapting each search based on the database's syntax (see Supplementary file 1). Alternative terminology and spelling variations were also included. Keywords were derived from the following: *antenatal*, *Indigenous*, *pregnancy*, *oral health*, *knowledge*, *attitudes*, *practices* and *challenges*. Limitations were included to search for terms identified in the title or the abstract. Fig. 1 is an example of a search strategy conducted in Medline Ovid.

After exporting literature from the databases, all duplicates were removed. The first author (ACK) screened the articles for eligibility based on their title and abstract. The full text of articles that met the eligibility criteria were retrieved, and reviewed by three independent reviewers (ACK, LR, MSS). Any disagreements with article inclusion were resolved initially through discussion, and if unresolved, by a fourth reviewer (AG). If there was any uncertainty with article eligibility, ACK contacted the study authors by e-mail for clarification.

4.4. Study quality assessment

All studies were independently assessed for their potential risk of bias[15] by three investigators (ACK, LR, MSS) using either the Joanna Briggs Institute (JBI) Checklist for Prevalence Studies or the JBI Checklist for Qualitative Research[12] depending on whether they were quantitative or qualitative articles, respectively. All disagreements were resolved through discussion, and when consensus could not be reached, a fourth reviewer was consulted (AG). These checklists were modified to produce a score. To produce a checklist score, articles were assigned a '1' or '0' if it sufficiently addressed an item. An 'N/A' was assigned to items that were not relevant to the article. Articles were considered 'Strong', 'Moderate' or 'Weak' if they scored 80–100%, 60–79% and <60% respectively.

4.5. Data extraction strategy

Extracted data included the study author, publication year, country, study design, participants, outcome measures, and study limitations. If the methods or results were poorly described, referenced literature was also reviewed for additional information. All efforts were made to contact study authors to clarify or gather further information.

4.6. Data synthesis

Quantitative and qualitative data relating to the outcome measures were extracted manually by the primary author (ACK) into a tabular form. Following a convergent integrated approach, the data were transformed ('qualitized') to facilitate a narrative summary method of synthesis and integration of these studies (with varying qualitative and quantitative methodologies) into the four oral health domains.[12,16] The preliminary synthesis was reviewed by additional authors (AG, LR, MS) who explored the relationships within the data, in addition to the reporting based on pooling and assessing the similarity of the data. The four domains were used to guide the studies included and interpret the review findings.

5. Results

5.1. Description of studies

Eleven articles were identified for inclusion (Fig. 2). The initial database search retrieved 195 records, and after 112 duplicates were removed, 83 records were included for screening. A further 855 records were identified through grey literature, cited-by references and reference lists. Out of the 938 records screened,

1. (indigenous or aborigin* or first nation or first people or native or first australians or american indian or eskimo or innu or inuit or metis or maori or maaori or torres strait or ATSI).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

2. (Oral health or oral care or dental or dentist or teeth or tooth or periodon* or oral hygiene).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

3. (Practice or behavio* or habit or Knowledge or awareness or inform* or Attitude or perception or belief or Barrier or challenge).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

4. (Antenatal or pregnan* or perinatal or neonatal or prenatal or postnatal or expectant mother).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

5. 1 and 2 and 3 and 4

Fig. 1. Example of search strategy in Medline-Ovid.

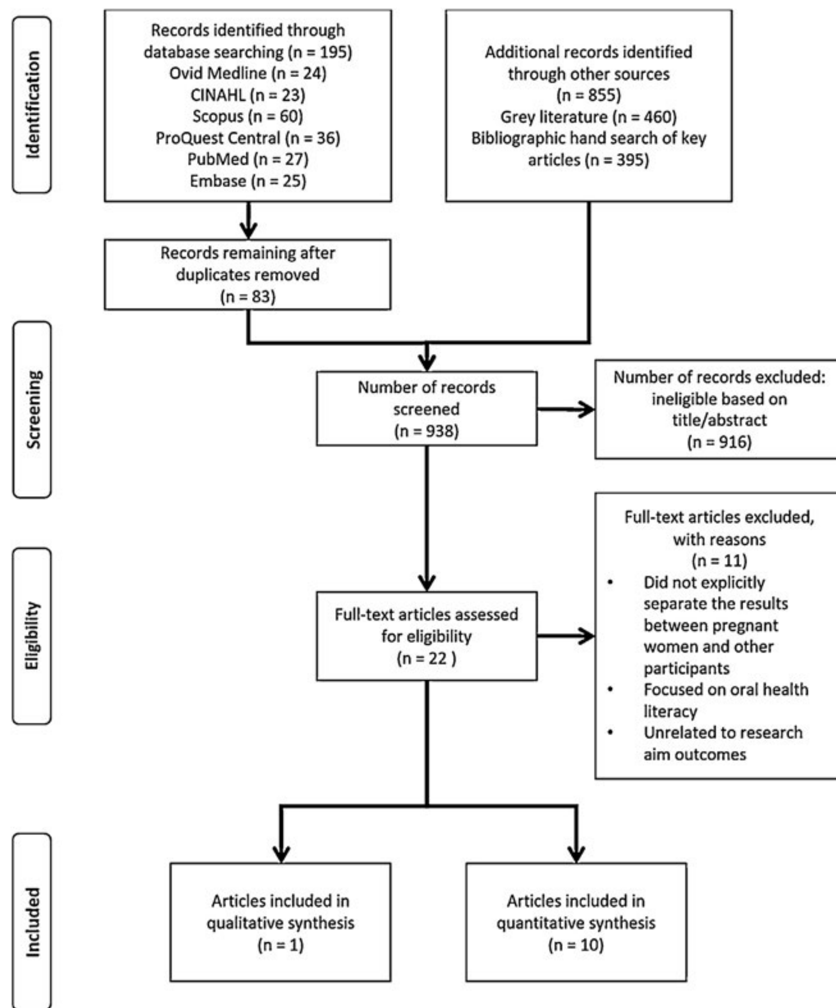

Fig. 2. PRISMA flow chart.

916 records were removed based on their title and abstract. The full texts of the remaining 22 records were retrieved to review in detail. Study authors were contacted if study methods or findings were unclear, which excluded 11 articles (see Supplementary file 2). The included articles consisted of nine published peer-reviewed articles and two Masters dissertations. Table 1 provides a summary of the findings.

5.2. Study characteristics

The included eleven articles were related to nine research studies (one study was reported in three articles), consisting of 10 quantitative cross-sectional research articles[17–26] and one qualitative study.[27] These studies involved 3642 participants over four countries (Australia, New Zealand, Canada and the United States), who identified as being of Australian Aboriginal and Torres Strait Islander descent,[17] Maori,[27] as part of the Waikato-Tainui tribal group,[18] Cree,[19] Native Hawaiian,[20] Aboriginal Canadian[24,25], American Indian[26] or as an Australian woman with an Aboriginal child.[21–23] Of the eight articles that reported on age, participating women's ages ranged between 14 to 49 years.[17–19,21–23,25,26] Seven articles reported on the women's education levels and completion up to secondary school,[17,18,21–23,25,26] five articles reported on welfare support,[18,21–23,26] six articles identified whether participants had other children,[17–19,21–23] and four articles also reported on women's tobacco and or alcohol consumption.[17,18,25,26]

All studies identified some oral health practices. Three articles described women's oral health knowledge,[18,19,24] six explored their attitudes towards oral health[18,22–25,27] and six identified some of the barriers experienced by Indigenous women.[17,18,23–25,27]

5.3. Study quality assessment findings

The quality assessment of the nine studies (Table 2) found that three studies received a 'Strong' quality rating,[19,20,27] three were rated as 'Moderate'[17,25,26] and three were evaluated as 'Weak'.[18,21–24] As the majority of eligible articles were observational, they were not excluded on the basis of 'Weak' study quality if they contributed information relevant to the oral health domains of interest. Based on the quality appraisal of the individual studies, the quality across the four domains was Moderate, with three domains (women's knowledge, practices, challenges) rated as 'Moderate' and one domain (attitudes) rated as 'Low' (Table 3).

5.4. Narrative synthesis

5.4.1. Knowledge and beliefs about oral health during pregnancy and early childhood

Three studies reported on the knowledge of Indigenous pregnant women around maternal and infant oral health.[18,19,24] Jessani[24] explored women's beliefs during pregnancy ($n = 37$) and found that seven Aboriginal Canadian women believed their teeth

Table 1
Summary of individual studies.

Author, year, location/study design	Participants	Knowledge/practices/attitudes/barriers	Study limitations
Ben et al. 2014	N = 365	<u>Practices</u>	• Time limited sampling: Tooth brushing measured by whether they brushed their teeth 'yesterday' (limits definitive conclusions about directions of causality, non-conservative estimate of tooth brushing frequency and no assessment of its adequacy)
Australia	Identified as Aboriginal or Torres Strait Islander living in South Australia	Tooth brushing the previous day was associated with: (95% CI)	• Convenience sampling, not necessarily representative of population (Australian Aboriginal women)
Cross-sectional/ Survey	51.4% (n = 178) aged 14–24 years[a]	Level of education (beyond secondary school): OR 2.07 (1.36–3.78)[*]	• Nil assessment of tooth brushing adequacy/frequency
	74% (n = 269) completed up to secondary school	Owning a car: OR 2.52 (1.53–4.15)[***]	
	84% (n = 299) owned a Health Care Card	Not avoiding the dentist due to high cost: OR 1.80 (1.03–3.11)[*]	
	51.0% (n = 186) lived in a rural location	High sense of personal control: OR 1.81 (1.11–2.98)[*]	
	48% (n = 173) owned a car	High level of social support: OR 1.83 (1.10–2.04)	
	7% (n = 25) expecting their first child	<u>Barriers</u>	
	53% (n = 191) currently smoked	11% (n = 39) reported experiencing racism/discrimination in a healthcare context	
	10% (n = 35) current alcohol users	Poor rates of self-reported tooth brushing associated with: (95% CI)	
		Owning a Health Care Card: OR 0.17 (0.06–0.48)[***]	
		High self-reported racism: OR 0.47 (0.26–0.86)[*]	
		High stress levels: OR 0.47 (0.29–0.76)[**]	
		High self-reported racism associated with:	
		Not attending a dental service because of cost: OR 2.14 (1.21–3.78)[**]	
		Difficulty paying a $100 bill: OR 2.43 (1.08–5.47)[*]	
Broughton et al. 2014	N = 222	<u>Knowledge</u>	• Convenience sampling
New Zealand	Identified as from the tribal area of Waikato-Tainui	99% (n = 218) disagreed that they could not do much to stop their child getting holes in their teeth	• Self-reported data
Cross-sectional/ Survey	Mean age 26.0 years (SD 6.6)	95% (n = 211) disagreed that keeping baby teeth clean was not important	
	39% (n = 85) completed up to secondary school	Believed it was important:	
	Household income source:	Not to have a lot of sweets (72%) (n = 158)	
	55% (n = 109) Benefit only	To use fluoridated toothpaste (51%) (n = 112)	
	35% (n = 70) Job only	To drink fluoridated water (38%) (n = 84)	
Randomised delayed intervention comparison design	11% (n = 21) Job and benefit	To use dental floss (55%) (n = 121)	
	68% (n = 149) held a Community Services Card	To visit dentists (85%) (n = 187)	
	60% (n = 132) household owned a car	<u>Practices</u>	
	37% (n = 81) expecting their first child	38% (n = 81) visited the dentist in the previous 12 months	
	14% (n = 31) had at least one medical condition	39% (n = 83) usually visited the dentist for a check-up	
	87% (n = 78) rated their general health as good/very good/excellent	<u>Attitudes</u>	
	44% (n = 96) current tobacco users	58% (n = 127) self-rated their oral health as fair/poor	
	8% (n = 18) current alcohol users	34% (n = 74) were uncomfortable with how teeth looked	
		Oral health-related fatalism:	
		Most people get problems with their teeth (74%) (n = 164)	
		Most people need to have their teeth pulled out (59%) (n = 129)	
		Most children eventually get holes in their teeth (61%) (n = 134)	
		<u>Barriers</u>	

Table 1 (*Continued*)

Author, year, location/study design	Participants	Knowledge/practices/attitudes/barriers	Study limitations
		60% (n = 131) unable to see a dentist due to high cost 18% (n = 40) reported dental fears	
Harrison et al. 2010 Canada Cross-sectional/ Survey (Study protocol)	N = 272 Cree women who recently gave birth or were between the 12th–34th week gestation (mean 20.2 weeks gestation) Mean age 25.6 years (age range 15–44) 65% had other children 42% had a child with a previously extracted tooth	Knowledge Oral health knowledge assessment: Mean /5 (SD): 3.0 (1.3) Practices 92% brushed their teeth with fluoride toothpaste 73% visited the dentist in the previous 2 years	• Convenience sampling • Insufficient detail on oral health knowledge scores
Hayes et al. 2015 United States Cross-sectional/ Survey	N = 4735 1516 (30%) women identified as Native Hawaiian Women who recently gave birth	Practices 54% visited the dentist for cleaning in previous 2 years (95% CI 50.2–56.7) Less likely to have dental cleaning compared to white mothers (APR 0.87; 95% CI 0.80–0.93)	• Self-reported data • Limited population representation as vulnerable populations may have unstable mailing address, phone numbers or may not be English literate • Ethnic categorisation based on birth certificate data, limiting representation of those who identify as Native Hawaiian
Jamieson et al. 2014a, 2014b, 2014c Australia Cross-sectional/ Interviews	N = 446 Women pregnant with Aboriginal child living in South Australia 83% identified as Aboriginal/Torres Strait Islander 86% unemployed/welfare as main income 83% owned a Health Care Card Median age 24.9 years (age range 14–43) 72% completed up to Secondary school 51% owned a car 80% were ≤37 weeks gestation 39% pregnant with their first child 26% had ≥4 children 35% had ≥5 people staying in their house the previous night	Practices 75% (n = 320) brushed their teeth the previous day 94% (n = 416) owned a toothbrush 35% (n = 152) visited the dentist in the previous 12 months Those who were 'active' (42% of sample) more likely to: Have seen a dentist in the previous year (40%)* Have brushed their teeth the previous day (86%)* Have used toothpaste (98%)* Attitudes 55% (n = 242) rated oral health as fair/poor. They were also more likely to: Visit the dentist because of a problem (64%)* Avoided the dentist due to cost (66%)* Had some difficulty paying a $100 dental bill (60%)* 80% (n = 354) had some difficulty paying a $100 dental bill 65% (n = 276) usually visited the dentist because of a problem 86% (n = 378) had a perceived need to see the dentist Those who were 'active' were less likely to: (% of sample) Report a dental fear (68%) Find it difficult to pay a $100 dental bill (29%)* Compared to 'active' women, 'pre-contemplative' women more likely to report oral health as fair/poor and that they: Usually visit a dentist because of a problem (64%) (n = 176)* Had a perceived need to see a dentist (61%) (n = 229)* Barriers 41% (n = 179) had some dental fear 36% (n = 157) had not gone to the dentist because of cost Poor rates of self-reported tooth brushing associated with: (95% CI) Low self-efficacy: OR 0.22 (0.12–0.43)* Poor self-rated oral health: OR 0.45 (0.29–0.72)*	• Self-reported data • Convenience sampling
Jessani 2010 Canada	n = 740 6% (n = 37) pregnant women identified as Aboriginal Canadian in British Columbia	Knowledge 3% believed they would lose calcium during pregnancy 18% believed their teeth would become sensitive	• Small sample size • Poor reporting on demographics for sub-population

Cross-sectional/ Survey	*[Other demographics not specified to sub-population]*	18% believed that their gums would bleed Practices 50% (n = 18) visited the dentist in the past 1 year 36% (n = 13) visited the dentist 1–5 years ago 14% (n = 5) visited the dentist >5 years ago Attitudes 81% rated their oral health as good/excellent Of those who had First Nations/Inuit dental insurance (n = 7): 57% (n = 4) rated their oral health as good 43% (n = 3) rated their oral health as fair Barriers Aboriginal status not significantly associated with self-reported dental service	
Lawrence et al. 2016 Canada Cross-sectional/ Interviews	N = 541 Resided in provinces of Manitoba and Ontario 90% 18–39 years (age range: 14–49 years) 56% (n = 302) lived on a reserve 67% completed up to secondary school 47% stopped drinking alcohol for pregnancy/currently drink 44% (n = 239) used to drink alcohol 92% were not current drug users	Practices 67% reported to have seen a dental professional in the previous year 45% reported that they attend regular dental check-ups Location of dental care: On reserve: 28% (n = 152) Off-reserve: 39% (n = 206) Both: 33% (n = 175) 88% (n = 474) have never had to pay for dental services 92% (n = 508) never floss/less than twice daily Attitudes 39% rated oral health as fair/poor 59% perceived need for preventive dental care Women who flossed ≥2 times/day reported experiencing high levels of racism (AOR 3.04 (1.28–7.23)[**] 15% (n = 89) rated highly on the Oral Health Impact on Quality of Life Barriers 10% reported experiencing racism/discrimination in a healthcare context Women who attended dental services off-reserve reported higher rates of racism (AOR 1.80, 95% CI 1.10–2.94) 17% (n = 89) had dental fears	• Racism a subjective measure, likely that participants under-reported personal experiences (e.g. racism) • Study captures individual forms of racism and not institutional • Some demographic measures not clearly delineated
Makowharemahihi 2006 New Zealand Qualitative focus groups	N = 4 75% self-identified as Maori (25% identified as Samoan, Miuean/Kiribati) Conducted in Porirua	Practices[b] Visited the dentist to alleviate pain rather than address the initial dental problem Utilised self-prescribed medication during pregnancy to manage dental pain or infection Attitudes Oral health services were not meeting the needs of future mothers Preventive care perceived as an unattainable luxury Clinical setting (open rooms with cubicles) were considered inappropriate but this was offset by 'nice' staff Access to an affordable, community-based Maori dental service 'for Maori' should link in to other health programmes but the development of this program depended on government-funded support Need for greater emphasis and coordination of maternal oral health information and support (i.e. through midwife/antenatal care provider) Barriers Accessing public dental services had a number of challenges (stringent eligibility criteria, only means of accessing dental care, emergency only, could not book appointments in advance, open clinical setting)	• Recruitment of participants undertaken by the Maori health service (Ora Toa), limiting the selection of focus group participants • Lack of validation of findings by a second investigator or participant checking • Perspectives of the study are limited to a single town in New Zealand (limited transferability to other contexts)

Table 1 (*Continued*)

Author, year, location/study design	Participants	Knowledge/practices/attitudes/barriers	Study limitations
		Private dental care perceived as unaffordable compared to competing life priorities (e.g. needs of the family, bills, groceries) Consultation appointments expensive and unhelpful Poor communication and interaction with dentists during appointments Poor accessibility (lack of transport to dental services)	
Warren et al. 2016 United States Cross-sectional/ Interviews	N = 239 Mothers from an American Indian Northern Plains tribal community Maternal age mean 23.8 years (SD 5.6) 88% mothers untreated dental decay 64% completed up to high school 65% (n = 93) annual family income < $40,000 Household size 5.9 people 40% (n = 96) currently smoked cigarettes	Practices 60% (n = 143) mothers brushed >1/day 30% (n = 72) mothers brushed 1/day 7% (n = 17) mothers brushes <1/day	• Sample from single American Indian tribal community

APR: Adjusted prevalence ratio; AOR: Adjusted odds ratio; OR: odds ratio; 95% CI:95% confidence interval.
[a] Age range not specified.
[b] Quotes relating to the data extracted from this study are in Supplementary file 3.
[*] $p < 0.05$.
[**] $p \leq 0.01$.
[***] $p \leq 0.001$.

would become sensitive and another seven believed that their gums would bleed. One woman believed that she would lose calcium during pregnancy.[24] Although most Maori women from a tribal area in New Zealand believed restricting sugar consumption was important (72%), fewer women believed using dental floss (55%), fluoridated toothpaste (51%) and drinking fluoridated water were important (38%).[18] From the same cohort, virtually all women (99%) believed they could influence the oral health outcomes of their infants and that keeping their baby's teeth clean was important (95%). Harrison et al.[19] assessed the dental knowledge of Canadian Cree pregnant women, however, details from this assessment were not reported.

5.4.2. Oral health practices

Four studies reported on women's oral health self-care behaviours.[17,23,25,26] Most Cree women (90%) from an American Indian tribal community,[26] and Australian women who were pregnant with an Aboriginal child (75%)[23] brushed their teeth at least once a day. Although Lawrence et al.[25] found that over 90% of Canadian Aboriginal women flossed less than twice a day, findings did not differentiate between those who flossed and those that did not. Among Aboriginal or Torres Strait Islander pregnant women, the likelihood of tooth brushing the previous day was significantly associated with owning a car (OR 2.52), higher education (OR 2.07), not avoiding the dental service due to cost (OR 1.80), social support (OR 1.83), and sense of personal control (OR 1.81).[17]

Seven studies described the dental seeking behaviours of Indigenous pregnant women.[18–22,24,25,27] The number of women who had visited the dentist in the previous 12 months ranged from 35 to 38%[18,21] in Australia and New Zealand, to 50–67% of women in Canada.[24,25] There was almost a 20% difference between the proportion of women in Hawaii (54%) and Canada (73%) who accessed a dental service in the previous two years.[19,20] Jessani[24] reported that 36% of Aboriginal Canadian women visited the dentist between one to five years ago. Between 39–45% of pregnant women in New Zealand and Canada reported that they regularly visited the dentist.[18,25] While most (72%) Aboriginal Canadian women accessed dental services care off-reserve exclusively, or a combination of both on- and off-reserve,[25] the majority of Australian women pregnant with an Aboriginal child last saw the dentist through a public dental service.[21]

Women who were pregnant with an Australian Aboriginal child[22] and who rated their oral health as fair/poor, were significantly more likely to visit the dentist because of a problem (64%), avoided the dentist because of cost (66%) and found paying $100 for the dentist difficult (66%). They were more likely to have a lower educational attainment, received welfare support and did not own a car.[22] However, women with an 'Active' mindset were more likely to have seen the dentist in the previous year.[23] In this study, 'Active' was related to the Stages of Change instrument, derived from the Trans-Theoretical Model (TTM) of health-related behavioural change.[28] The TTM defined 'Active' persons as those who made visible changes to their old behaviours or developed healthier behaviours. Native Hawaiian pregnant women were less likely to have a dental cleaning compared to white, non-Indigenous mothers.[20] Visiting the dentist was viewed as a last resort to alleviate pain rather than address the initial problem, with some pregnant women reporting that they would rather endure pain or use self-prescribed medication to manage dental pain and infections.[27]

5.4.3. Attitudes relating to oral health

Four studies reported on pregnant women's self-rated oral health,[18,23–25] two on satisfaction with dental appearance,[18,21] one on beliefs[18] and two on their perceived dental needs.[25,27] Women in New Zealand (58%), Australia (54%) and Canada (39%) rated their

Table 2
Critical appraisal of individual studies using Joanna Briggs Institute (JBI) appraisal tools.

Study	JBI — Prevalence study appraisal tool: methodological items									Score
	1 Sample frame appropriate?	2 Participants sampled appropriately?	3 Sample size adequate?	4 Study subjects & setting described?	5 Sufficient coverage of the identified sample in analysis?	6 Valid methods used for condition identification?	7 Condition measured in a standardised way for all participants?	8 Method of statistical analysis appropriate?	9 Response rate adequate?	
Ben et al.[17]	–	+	+	+	–	+	+	+	+	7/9 78%
Broughton et al.[18]	–	–	+	+	–	–	N/A	–	+	3/8 38%
Harrison et al.[19]	+	+	+	+	+	+	+	+	+	9/9 100%
Hayes et al.[20]	+	+	+	+	+	+	N/A	+	+	8/8 100%
Jamieson et al.[21,22,23]	–	–	–	+	–	+	+	+	+	5/9 56%
Lawrence et al.[25]	–	+	–	+	+	–	+	+	+	6/9 67%
Jessani[24]	–	–	+	+	–	–	+	–	+	4/9 44%
Warren et al.[26]	+	+	–	+	–	+	+	–	+	6/9 67%

Study	JBI — Checklist for qualitative research: methodological items										Score
	1 Philosophical perspective & methodology congruent?	2 Methodology & research question/ objectives congruent?	3 Methodology & methods for data collection congruent?	4 Methodology and representation of data analysis congruent?	5 Methodology & interpretation of results congruent?	6 Researcher's cultural/ theoretical stance located?	7 Influence of the researcher on research, and vice-versa, addressed?	8 Participants adequately represented?	9 Ethical conduct of research?	10 Conclusions drawn flow from analysis or data interpretation?	
Makowharemahihi[27]	+	+	+	+	+	+	–	+	+	+	9/10 90%

+: satisfies criteria; –: does not satisfy criteria; N/A: not applicable to study design.

Table 3
Critical quality appraisal across the four domains.

Study	Knowledge	Practices	Attitudes	Challenges	Total
Ben et al.[17]		Moderate		Moderate	
Broughton et al.[18]	Low	Low	Low	Low	
Harrison et al.[19]	High	High			
Hayes et al.[20]		High			
Jamieson et al.[21,22,23]		Low	Low	Low	
Jessani[24]	Low	Low	Low	Low	
Lawrence et al.[25]		Moderate	Moderate	Moderate	
Makowharemahihi[27]		High	High	High	
Warren et al.[26]		Moderate			
Average total	Moderate	Moderate	Low	Moderate	Moderate

oral health as fair or poor.[18,21–23,25] Only one study, conducted in Canada, reported a higher proportion (81%) of women who rated their oral health as good or excellent.[24] Between 34–50% of women[18,21] were uncomfortable with their dental appearance. Some women also had fatalistic beliefs, including that most people have some problems with their teeth (74%) and will require a dental extraction (59%).[18]

Among women pregnant with an Aboriginal Australian child, 86% believed they needed to see a dentist,[22] compared to 59% of Aboriginal Canadian women.[25] One Maori woman lost teeth in all her pregnancies, but believed that preventive private dental care was unaffordable especially when it was weighed up against other family necessities.[27] Although Maori women believed they had a role in maintaining the family's oral health, handouts alone were viewed as ineffective to changing dietary sugar consumption.[27] Some believed that a community-based dental service would be beneficial and would best meet the community's oral health needs.[27]

5.4.4. Perceived barriers and challenges relating to oral health

Six studies explored challenges that pregnant women experienced relating to their oral health care behaviours and access to dental services.[17,18,23–25,27] Australian Aboriginal and Torres Strait Islander women were less than half as likely to brush their teeth if they had poor self-rated oral health, low self-efficacy,[23] a Health Care Card, experienced racism, smoked or had high stress levels.[17]

Experiences of racism appeared to affect access to health services. In Australia and Canada, approximately 10% of women surveyed experienced racism within a healthcare setting.[17,25] Women with an off-reserve dental appointment were almost twice as likely to report racism.[25] Those who experienced racism were more than twice as likely to avoid the dental service because of cost or had difficulty paying $100.[17] However, Jessani[24] observed that Aboriginal status was not significantly associated with access to dental services.

Cost of dental services was a deterrent for 33–60% of women,[17,18] with 81% of pregnant women having some difficulty paying a dental bill.[17] In Canada, 88% of Aboriginal women had never been asked to pay for a dental service.[25] Some Maori women experienced difficulties with navigating access to the public dental service.[27] In this instance, the public dental service was an emergency-only model where the eligibility criteria were not flexible enough to meet their needs even though it was the only means for accessing dental care for some women. Lack of accessible transport was cited as another barrier to dental care by Maori women.[27] In Australia, 48–51% of women reported they owned a car[17,22] whereas in New Zealand, 60% had a household-owned car.[18]

6. Discussion

The literature moderately supports that Indigenous pregnant women globally have some positive oral health attitudes and practices including brushing their teeth at least once a day and recognising the need to see a dentist. However, they also experience numerous challenges that may affect their attitudes and oral health seeking behaviours. Although there was a lack of evidence about their oral health knowledge, there were some misconceptions around positive oral health behaviours. Their oral health practices, attitudes and challenges appeared to be influenced by psychosocial and socioeconomic factors and their healthcare context.

Access to dental services varied between Indigenous pregnant women depending on the country, highlighting the difference between healthcare models, and socioeconomic and psychosocial factors. Jamieson et al.[21] found Australian women pregnant with an Aboriginal child in South Australia accessed dentists at almost half the rate (35%) of Aboriginal Canadian women in the provinces of Manitoba and Ontario (67%).[25] Approximately 50% of non-Indigenous women in these countries attended a dental service during pregnancy,[8,29] perhaps indicating a similarity in provision of mainstream services within these countries. In light of these findings, Lawrence et al.[25] revealed that almost 90% of Aboriginal Canadian women had never paid for a dental service, compared to 80% of Australian women pregnant with an Aboriginal child who reported difficulty paying for a dental bill.[21] These discrepancies in access to care highlight the potential differences in healthcare models internationally.

Access to dental services varies significantly between Canada, Australia and New Zealand. Piloted in 2004, the national Children's Oral Health Initiative was developed for Canadian First Nations and Inuit pregnant women and children.[30] This initiative involved community health workers delivering dental care, and demonstrated improved access to dental care.[31] In Australia, dental care is state-funded with no universal pathway to public dental services for Aboriginal and Torres Strait Islander adults, with the exception of scattered Aboriginal community-controlled services and some public health services.[32] Although adults with a low income Health Care Card are able to access dental services,[33] they are typically placed on long waiting lists and may not necessarily include all Aboriginal and Torres Strait Islander pregnant women. New Zealand developed a similar model where public dental care is available for those with a low income and require emergency dental care such as pain relief or a dental extraction.[34]

Relatively low rates of access to dental services among some Indigenous pregnant women may also be attributed to the perceived unaffordability of private dental services, which is also reported among non-Indigenous women with lower incomes and educational levels.[35] For some Indigenous women, preventive dental care was a luxury rather than a necessity. Access to services may also be linked to having an 'Active' mindset,[22] indicating the need for specific, personal support. Not owning a car may also reduce access to services, which has been reported with other women.[24,36]

Some women avoided emergency dental services due to difficulties in navigating the service, underlining the disconnection between population needs and dental service provision. Promoting the oral health of Indigenous women needs consider the mother's needs in relation to the family.[27] While this view of health is shared between Indigenous cultures globally, it typically contradicts the ethos of disease and medicine underlying Western health services.[37] While only a minority of women reported experiences of racism in a healthcare setting, experiences of racism may be under-reported. Therefore, this may be better reflected in the attendance of Aboriginal Australian peoples to the mainstream health services since a deficit in staff cultural competence can contribute to non-attendance.[38] This demonstrates the need to provide services that have the organisational structure, cultural staff training, and the appropriate clinical processes to meet the community's needs.[38]

Tooth brushing appeared to be relatively high and was mediated by sociodemographic and psychosocial factors. However, these rates were lower compared to women in high income countries[8,39] where over 90% of pregnant women brushed their teeth at least once a day. Although only one study explored flossing, the findings did not differentiate between those who flossed and those that did not. Similarly to non-Indigenous populations,[40] tooth brushing was associated with socioeconomic factors, including educational attainment, owning a car and having the ability to pay for a dentist. It was also associated with psychosocial factors, including the level of social support and perceived personal control. Since tooth brushing is relatively inexpensive, a lower educational attainment combined with a lack of personal support is likely to contribute to lower rates.[40]

This review has highlighted gaps and recommendations around the oral health among Indigenous pregnant women worldwide. While little has been published on Indigenous pregnant women's oral health knowledge, some women had misconceptions. Furthermore, a lack in accessible, culturally appropriate dental services was identified, emphasising the need to develop mainstream services to become safe and accessible for Indigenous pregnant women, especially where community-tailored dental services are not available. Since handouts alone were not seen as effective forms of education, involving a care coordinator or Indigenous Health Worker may could assist women to navigate public dental services, dispel misconceptions and provide education on the importance of preventive oral health practices such as tooth brushing, flossing and accessing the dentist regularly. Broadening the eligibility criteria to access public dental services and providing preventive dental care during pregnancy would increase the uptake of dental services and reduce the cost of expensive, emergency treatments.

This review had some limitations. Since studies included were limited to Indigenous pregnant women in four countries, the findings from this review may not necessarily be transferable to other Indigenous populations with different cultural distinctions and healthcare contexts. One underlying factor may be due to the inclusion of articles published in English. The 11 articles also varied in study aims, methods and outcome measures which restricted the aggregation of results into a quantified analysis. Furthermore, the quality appraisal indicated that overall, the studies only addressed the methodological items moderately, limiting the conclusions that can be made within this population.

7. Conclusions

Although Indigenous women in high income Western countries have positive oral health seeking practices and attitudes during pregnancy, this reviews highlights to policy-makers and researchers some of the challenges relating to their socioeconomic, psychosocial and healthcare context that affect their oral health knowledge, attitudes and practices. Poor access to dental care services may be attributed to difficulties with navigating services that may not adequately accommodate for Indigenous women's cultural needs. Although the breadth of the literature was limited and the evidence from this review was only moderate, this should not discount the findings. This review suggests that these challenges could be mitigated with the implementation of care coordinators to provide support and assistance to Indigenous women accessing services. Ideally, this should be complemented with community-based, culturally appropriate dental services. To improve the strength of the evidence, more comprehensive and well-designed studies are required.

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Conflict of interest

None declared.

Authors' contributions

ACK and AG designed the study. ACK conducted the initial screening assessment, and the second screening of the articles were reviewed by ACK, LR, MSS and AG. All authors contributed to the interpretation of the findings. ACK drafted the first manuscript, with substantive revisions from AG, LR, MSS and KG. All authors have read and approved of the final manuscript.

Availability of data and material

All data generated or analysed during this study are included in this published article and in the supplementary file for transparency.

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Appendix A. Supplementary data

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Chapter 3: Background (Part 2)

3.1 Overview

The previous chapter established the needs and gaps in oral health among pregnant women, particularly among Indigenous pregnant women. This chapter will explore potential strategies to promote maternal oral health among Indigenous as well as Aboriginal and Torres Strait Islander women during pregnancy, current antenatal oral health recommendations and existing strategies to promote oral health during pregnancy. The chapter will conclude with a second published review article on the potential role of Indigenous health workers worldwide to promote the oral health of Indigenous women during pregnancy.

3.2 Strategies to Improve Maternal Oral Health

The need for greater attention in maternal oral health care during the antenatal period was a catalyst for the release of antenatal oral health guidelines and consensus statements in the United States and Europe.[43, 89-91] These guidelines recognise that pregnancy offers an opportunity to educate women on the importance, relationship and impact of oral health for both the mother and the baby. Moreover, they were designed to provide formal recommendations to health professionals, including dental and non-dental antenatal care providers, about oral health during pregnancy. The recommendations emphasise that non-dental antenatal care professionals, like midwives, nurses and physicians, should advise pregnant women about oral health care and provide referrals to dental services through formal referral pathways.[43, 90, 92] In Australia, national pregnancy care guidelines on oral health during pregnancy have been released, advising women to have an oral health check and dental treatment if required.[93]

To strengthen the referral of pregnant women by antenatal care providers to dental services, only a few countries, like the United Kingdom (UK) and Australia, have implemented special provisions for women to access subsidised dental services during

pregnancy.[94, 95] In the UK, the National Health Service (NHS) provides free dental treatment for all women who have received a maternity certificate from their midwife or GP, or have a maternity exemption certificate.[95] These certificates are issued at no cost by the health care provider to verify the pregnancy (or delivery in the last 12 months), expected week of birth and the actual date of the birth.[95] There are currently no national policies in Australia that specifically provide public dental care for women during pregnancy. However, for women who are eligible for public dental treatment within the state government health policy, they may be identified as requiring priority care. In Victoria, pregnant women who are refugees, asylum seekers or who have a Health Care Card or Pensioner Concession Card are eligible for public dental services and are provided a dental appointment without being wait-listed.[96] In NSW, however, pregnant women who are eligible for dental services may wait up to three months for a dental appointment.[97]

A key component to increasing access to dental services and improving maternal oral health, however, is the provision of routine anticipatory guidance about oral health by antenatal care providers. Anticipatory guidance may be defined as proactive health advice given by health care providers to parents to promote healthy development among children.[98] As recommended in international antenatal oral health guidelines, antenatal care professionals are encouraged to provide oral health education, oral health risk assessment and referral to dental services.[89] Providing oral health education during pregnancy and during the first year of life has been found to significantly decrease the incidence of severe ECC, which can have a long term impact on the child's oral health in later life.[99] In addition, one Australian study found that a lack of awareness about the need for dental care during pregnancy was a stronger predictor for not accessing dental services than cost of dental care.[100] These findings indicate that models of care to improve maternal oral health need to

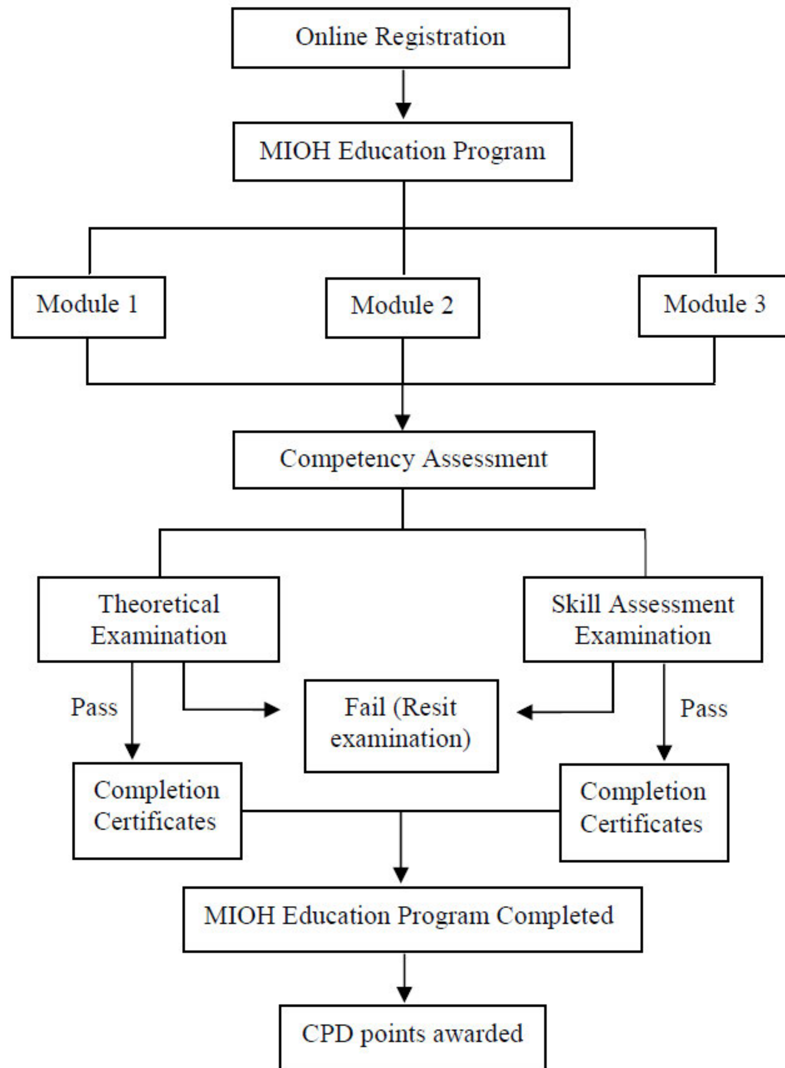
integrate both specific oral health advice for pregnant women and subsidised referral pathways to the dental service.

3.3 The Midwifery Initiated Oral Health (MIOH) Program

Capacity building antenatal care providers have demonstrated improvements in maternal oral health knowledge and outcomes in both Australia and internationally.[101, 102] In Australia, one such program is the Midwifery Initiated Oral Health (MIOH) program.[103, 104] This model of care was designed to capacity build registered midwives to integrate oral health into their practice and provide anticipatory oral health advice, oral health screening and facilitate dental referrals for pregnant women. To facilitate this, the MIOH program includes training in three main areas: 1) to provide antenatal oral health advice to pregnant women; 2) to screen pregnant women for oral health problems using a validated, sensitive screening tool; and 3) to facilitate a dental referral for pregnant women, where appropriate, through a priority referral pathway to dental services.[104]

The MIOH training was developed to be delivered through an online platform through various modules. As an incentive, continuing professional development (CPD) points are offered to registered midwives who complete the MIOH program. An outline of the program structure can be seen in Figure 3.

Figure 3 *Outline of Online MIOH Education Program. Used With Permission.*



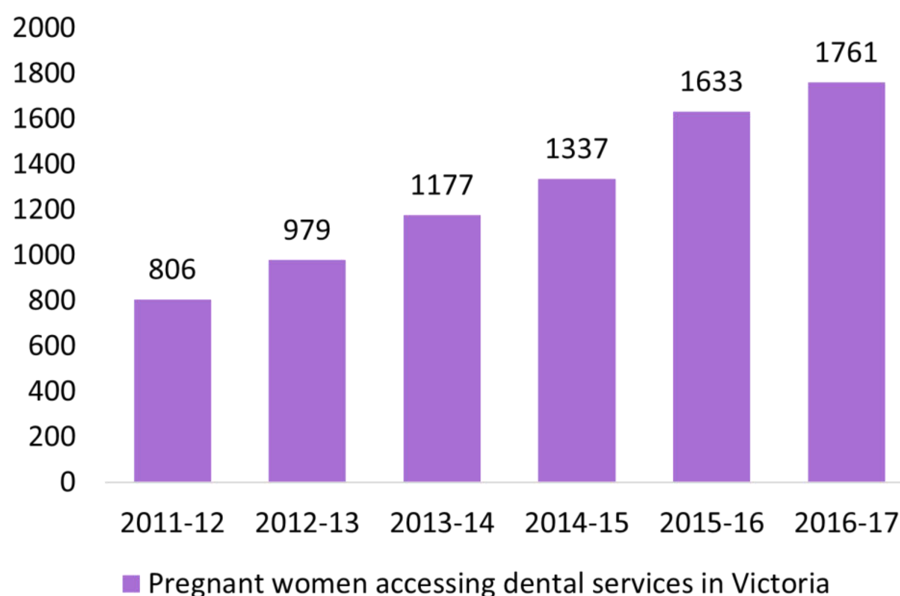
Given that antenatal providers often need to deliver substantial amounts of information during appointments, it was essential that the MIOH program integrate a validated screening tool, to identify women who required a dental referral, that could be easily administered. The screening tool that was developed as part of the MIOH program (Figure 4) was validated against the two gold standards for screening for oral health, the 14 item Oral Health Impact Profile (OHIP-14) and a clinical check by dentists.[105] The screening tool was piloted across a large cohort of pregnant women and was found to have high sensitivity (88-93%) in identifying participants who were at risk of poor oral health.

***Figure 4** MIOH Two-Item Screening Tool. Used With Permission*

The maternal oral screening tool
Item 1. Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any other problems in your mouth? Yes □ (1) No □ (0) If yes, visual inspection of oral cavity (optional to confirm Item 1) Item 2. Have you seen a dentist in the last 12 months? Yes □ (0) No □ (1)
Items 1 and 2 are scored either 0 or 1. Participants with a total score ≥ 1 are referred for a dental check-up.

The MIOH program significantly improved the oral health knowledge of midwives.[104] After the training, most midwives were confident to discuss oral health during an antenatal appointment (82%) and provided a dental referral where appropriate (77.6%).[104] A multi-centre randomised controlled trial of the model of care concluded that combining education, screening and dental referrals significantly improved pregnant women's uptake of dental services, oral health knowledge, self-reported quality of oral health and oral health outcomes.[103] Furthermore, process evaluation studies demonstrated acceptability and feasibility for scaling up the program.[106-108] Modelling in an economic evaluation study found that scaling up the MIOH program would be a cost-effective intervention.[109] Testament to the program's effectiveness, the state government's body for dental care in the Australian state of Victoria, Dental Health Services of Victoria, implemented the MIOH program and found that after five years (2011-2012 to 2016-2017), there was a more than double increase in the number of pregnant women accessing dental services during pregnancy (Figure 5). By the end of December 2019, there were over 300 Victorian midwives who had completed the MIOH training.[110] In 2015, the Australian College of Midwives also offered and promoted the MIOH program nationally for midwives.

Figure 5 *Pregnant Women Accessing Dental Services in Victoria After Implementation of the MIOH Program. Adapted from Dental Health Services Victoria*[2]



One of the key limitations of the MIOH program is that while the evaluations focused on pregnant women, it did not include any specific information on Aboriginal and Torres Strait Islander women. Thus, while the MIOH program reported effectiveness and acceptability among Australian women, little is known about the involvement of Aboriginal and Torres Strait Islander women or whether the program addressed their needs.

3.4 Strategies for Aboriginal and Torres Strait Islander Pregnant Women

Working towards culturally safe health services is an essential component to developing strategies that would effectively increase health equity between Aboriginal and Torres Strait Islander and non-Indigenous women.[111] The concept of cultural safety should be distinguished from cultural competency to understand how strategies to promote antenatal oral health among Aboriginal and Torres Strait Islander women should be developed.

Cultural competency may be defined as the behaviours, attitudes and policies of both individuals and systems to provide effective cross-cultural care and services.[112] Cultural safety, which was first described by Māori nurses in New Zealand during the 1990s, shifts the focus from the knowledge or behaviours of individuals and systems to the need to consider the impact of power relationships within the healthcare provider-client dynamic to ensure that individuals feel safe with the care that has been provided.[113] Thus, the fundamental difference between cultural competency and cultural safety is that the latter addresses the issue of power.[111]

The crux of cultural safety is that it considers the impact of the inherent power structures within healthcare,[111] rather than a lack of cultural competency of the health care provider or system. These power structures tend to privilege certain ethnic or cultural groups, creating imbalanced power relationships between the health care provider and the client. Ultimately, these imbalances in power can perpetuate marginalisation, bias, prejudice as well as racism.[111] Thus, cultural safety requires both the health care provider and the health care service to critically reflect on how culture may have shaped their assumptions or prejudices, and how this may contribute to a lower quality of health care delivery.[114]

Although current policies are designed to provide the best possible care for Australian pregnant women, Western perspectives largely define the values that underpin these policies. Such values were evident in the MIOH program, which was developed in tandem with mainstream antenatal guidelines and policies. Moreover, the MIOH program was not developed alongside local Aboriginal and Torres Strait Islander communities to ensure that it would be culturally safe. Key to creating a culturally safe antenatal workforce is increasing the number of antenatal care providers who identify as being of Aboriginal and Torres Strait Islander descent.[115] In Australia, even though Aboriginal and Torres Strait Islander women represent 4.6% of mothers who give birth,[29] Aboriginal and Torres Strait Islander midwives

represent 1% of the total midwifery workforce in Australia.[116] Historical determinants, negative birthing experiences, and lack of cultural safety may deter some Aboriginal and Torres Strait Islander women from accessing mainstream antenatal services.[117, 118]

Although there are existing programs in place to support and increase the number of Aboriginal and Torres Strait Islander midwives,[119, 120] there are various antenatal care models that employ other Aboriginal health staff to improve the cultural safety for Aboriginal and Torres Strait Islander women during pregnancy,[121-123] and though not an exhaustive list of the successful and celebrated antenatal models of care developed by Aboriginal and Torres Strait Islander peoples for Aboriginal and Torres Strait Islander women, these include the Midwifery Group Practice model; the Midwifery Continuity of Care program; the Aboriginal Maternity Group Practice Program (AMGPP); the Aboriginal Family Birthing Program (AFBP); the Australian Nurse-Family Partnership Program (ANFPP); and the Aboriginal Maternal and Infant Health Service (AMIHS).[93, 124] In Perth, the AMGPP involves Aboriginal grandmothers and Aboriginal Health Officers who are employed to work with midwives (who may not be Aboriginal and Torres Strait Islander) to provide culturally safe antenatal care to women.[125] Similarly, in the AFBP based in South Australia, an Aboriginal Maternal and Infant Care Worker partners with a midwife to deliver antenatal and postnatal care to Aboriginal women. In NSW, the AMIHS uses a similar model where an AHW and midwife provide culturally safe clinical care and support to clients during the antenatal period.[93, 125]

Aboriginal and Torres Strait Islander Health Workers, commonly referred to in the literature as AHWs, are key personnel in the primary health care workforce.[126] In Australia, an AHW is an Aboriginal and Torres Strait Islander person who has, at minimum, a nationally-recognised Certificate III Aboriginal and Torres Strait Islander Primary Health Care qualification which can be achieved through vocational education. AHWs may also provide holistic, specialised care; these areas of specialisation may include mental health, ear

health, alcohol and other drugs, diabetes, and maternal and infant health care.[126] Other providers, such as FPWs within the ANFPP, may not require the same qualification as AHWs but may provide similar services.[127] AHWs and FPWs may provide a broad range of treatments for clients, depending on the individual's specific clinical training. AHWs and FPWs may also act as interpreters, communicators and advocates for clients when accessing health care services and other health care providers.[126, 127] The following publication provides a review of the current literature on the potential role of Indigenous health staff in promoting maternal oral health care during pregnancy, as well as existing models of care, training programs and screening tools to facilitate oral health promotion.

3.5 Citation: Paper 2

Villarosa, AC., Villarosa, AR., Salamonson, Y., Ramjan, LM., Sousa, MS., Srinivas, R., Jones, N., George, A**.,** (2018) The role of Indigenous health workers in promoting oral health during pregnancy: A scoping review. BMC Public Health 18:381. doi: 10.1186/s12889-018-5281-4

3.6 Aim: Paper 2

This scoping review aimed to identify the potential role of IHWs in promoting oral health during the antenatal period. Specifically, this review sought to address the following research areas:

1. The evidence of the role of IHWs in promoting maternal oral health within Indigenous communities
2. Training programs available to assist IHWs in oral health promotion during the antenatal period
3. Available oral health screening tools that can be used by IHWs for women during the antenatal period.

3.7 Conclusion: Paper 2

The previous systematic review, exploring the oral health knowledge, attitudes, behaviours, and challenges of Indigenous pregnant women identified the need for a care coordinator, such as an Indigenous Health Worker, for improved continuity and integration of oral healthcare. This scoping review identified that while there is some evidence around Indigenous Health Workers promoting maternal oral health, there are currently no evaluated antenatal oral health models of care developed specifically for Indigenous Health Workers, including AHWs. Most of the oral health training programs and models that have been developed for Indigenous Health Workers support Indigenous peoples across other stages of the lifespan, particularly for children and adults. Among other non-dental professionals, maternal oral health models of care, training programs and screening tools have been developed, evaluated, and successfully implemented. Although these models of care and training tools could be used among Indigenous communities, this review highlighted the need for such tools to be adapted to be culturally appropriate and involve Indigenous health staff, including Indigenous Health Workers, within these models of care. Finally, while there is a need for capacity building among Indigenous Health Workers, there also need to be corresponding changes in policy to strengthen oral health referral pathways from antenatal health services for Indigenous women.

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The role of indigenous health workers in promoting oral health during pregnancy: a scoping review

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Abstract

Background: Early childhood caries is the most common chronic childhood disease worldwide. Australian Aboriginal and Torres Strait Islander children are twice more likely to develop dental decay, and contributing factors include poor maternal oral health and underutilisation of dental services. Globally, Indigenous health workers are in a unique position to deliver culturally competent oral healthcare because they have a contextual understanding of the needs of the community.

Methods: This scoping review aimed to identify the role of Indigenous health workers in promoting maternal oral health globally. A systematic search was undertaken of six electronic databases for relevant published literature and grey literature, and expanded to include non-dental health professionals and other Indigenous populations across the lifespan when limited studies were identified.

Results: Twenty-two papers met the inclusion criteria, focussing on the role of Indigenous health workers in maternal oral healthcare, types of oral health training programs and screening tools to evaluate program effectiveness. There was a paucity of peer-reviewed evidence on the role of Indigenous health workers in promoting maternal oral health, with most studies focusing on other non-dental health professionals. Nevertheless, there were reports of Indigenous health workers supporting oral health in early childhood. Although some oral health screening tools and training programs were identified for non-dental health professionals during the antenatal period, no specific screening tool has been developed for use by Indigenous health workers.

Conclusions: While the role of health workers from Indigenous communities in promoting maternal oral health is yet to be clearly defined, they have the potential to play a crucial role in 'driving' screening and education of maternal oral health especially when there is adequate organisational support, warranting further research.

Keywords: Indigenous, Aboriginal, Health workers, Oral health, Antenatal

Background

Globally, Indigenous populations experience inequality in health status across the lifespan compared to their non-Indigenous counterparts [1]. While the factors which contribute to these inequities vary across continents, the inherent issues are remarkably similar. They are attributed to a combination of socioeconomic factors, colonisation, globalisation, migration, trans-generational loss of culture and disconnection from the land [2]. Although there have been some improvements in health outcomes in recent years, the gap in Australia remains significant [3].

In Australia, the Aboriginal and Torres Strait Islander people have poorer outcomes in maternal and infant health. A number of reports focusing on Indigenous people in Australia, New Zealand, Canada and the United States have shown that among pregnant women, the rates of gestational diabetes and the risk of developing Type 2 diabetes are higher compared to non-Indigenous women [4, 5].

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Further, infants who are born to Australian Aboriginal and Torres Strait Islander mothers are also more likely to be born pre-term and of low birth weight [6] compared to Australians of other descents. In addition, Aboriginal and Torres Strait Islander children are twice as likely to develop early childhood caries (ECC) in their deciduous teeth and caries in their permanent dentition, compared to other children [7]. ECC is the most common chronic childhood disease worldwide and affects various aspects of the child's functioning and quality of life [8]. Although typically overlooked, some evidence supports that maternal oral health may be associated with these health outcomes [9, 10].

During pregnancy, physiological factors such as hormonal variations, incidence of nausea and vomiting and dietary changes, increase the risk of pregnant women to dental problems such as dental decay and periodontal diseases [11, 12]. This is further exacerbated by sub-optimal diabetes control that has been associated with higher salivary glucose secretion, thus contributing to plaque accumulation [13, 14]. Poor maternal oral health has also been linked with increased adverse birth outcomes such as preterm birth, low infant birth weight and preeclampsia [15, 16]. Periodontal disease has also been shown to affect glycaemic control and contribute to diabetes complications [17]. Furthermore, maternal dental decay can also contribute to ECC as some babies can acquire their oral flora from carers, especially mothers, in addition to fomites such as feeding utensils which can facilitate bacteria transmission [18, 19].

Indigenous Australian pregnant women have a higher prevalence of dental pain relative to the general population and are more likely to avoid certain food due to these problems [20]. In light of the importance of maternal oral health, all pregnant women in Australia are encouraged to have an oral health check and education with their antenatal care provider, including treatment with a dental professional if required [21], similar to the United States, whereby women are advised to consult a dentist early during pregnancy and are provided oral health education, risk assessment and referral during antenatal care [22]. Regrettably, Indigenous mothers are more likely to attend their first antenatal visit later in the pregnancy, and these visits are less frequent than that of non-Indigenous pregnant women [23, 24]. The literature also reports a trend of underutilisation of preventive health services, including dental services [25, 26]. While financial cost is a main barrier to health service utilisation for this population [27], underlying social and historical factors continue to contribute to their distrust of healthcare professionals and the health system [28].

In view of the current challenges in accessing oral healthcare for Indigenous pregnant women worldwide, it is timely to explore alternative care providers to facilitate dental health-seeking behaviours. Indigenous Health Workers (IHWs) are well-placed to fill this gap because of their insight into the specific cultural needs and protocols of their communities, the importance of family networks and the impacts of colonisation on their health status and access to health services. IHWs in Australia originated from the Northern Territory during the 1950s where they were initially professionally employed as leprosy health workers, and later segued into their role as medical assistants. During the 1970s, they were recognised as important cultural brokers within their communities [29] as they were able to bridge the disconnect with non-Indigenous health professionals, and facilitate the process of accessing mainstream services by crossing the cultural barriers [29, 30]. This resulted in the development of the Aboriginal-controlled health services in Australia. In the non-dental health context, IHWs in Australia have been successful in leading culturally-appropriate health promotion and educational activities, in addition to being advocates for Indigenous communities [31–33]. Nevertheless the roles and functions of IHWs are often not well-defined as their roles are usually contingent on the local community's needs, crossing the boundaries of clinicians, social support workers, cultural mentors and managers [29]. Despite the effectiveness in promoting primary healthcare among their Indigenous communities, a paucity in awareness by other healthcare workers, employers and organisations of their broad skillset may have contributed to the limited opportunity for training and career development [29]. Thus, the role of IHWs in promoting oral health for pregnant Indigenous women has received little attention.

Aim

This review aimed to identify the potential role of IHWs in promoting oral health during the antenatal period. Specifically, this review sought to address the following research areas:

1) The evidence of the role of IHWs in promoting maternal oral health within Indigenous communities.
2) Training programs available to assist IHWs in oral health promotion during the antenatal period.
3) Available oral health screening tools that can be used by IHWs for women during the antenatal period.

Terminology

In this review, the term *Indigenous health worker* was used to include health workers from Indigenous communities globally, and referred to persons who work within communities and act as the bridge between consumers and healthcare providers. They facilitate access to health services within communities and assume a role

in health promotion and provision of culturally sensitive services [34, 35]. The term encompasses other terms like *health worker, community health worker, Aboriginal health worker* or *Aboriginal liaison officer*. In Australia, the terms *Aboriginal health worker* or *Aboriginal and Torres Strait Islander health worker* are used rather than *Indigenous health worker*. The term *non-dental health professionals,* refers to all health professionals other than dental professionals.

Methods

Study design

To source the available evidence regarding the role of IHWs in promoting oral health within Indigenous communities, training programs available to perform their role and functions, and the available oral health screening tools, we undertook a scoping review, using the framework described by Arksey and O'Malley [36]. This framework provided the structure to investigate the extent, range and nature of existing research, summarise the evidence, and identify any gaps within the literature. Unlike a systematic review, scoping reviews do not focus on the quality of the research which can significantly limit the type of studies included, enabling a broad range of literature, including reports, clinical guidelines, consensus statements, qualitative and quantitative studies [36]. Another advantage of a scoping review is the iterative process of going back-and-forth and redefining the study aims and search strategies based on the initial findings. This flexibility enables the researcher to gather a broad range of studies to inform the study topic, particularly suitable for topics with limited published evidence in the literature.

Search strategy

A preliminary search was conducted with the assistance of a librarian for the following databases: CINAHL, Medline (Ovid), PubMed, ProQuest, Scopus and the Australian Public Affairs Information Service – Aboriginal and Torres Strait Islander Subset. We developed an individualised search strategy for each database according to their indexing terms. Boolean operators, truncations and Medical Subject Headings (MeSH) were also included to accommodate variations in spelling and terminology across countries. Reference lists of key articles were also searched for relevant literature. A search for grey literature through government and non-government organisations was also performed. Search strategies were derived from keywords which included: Aboriginal/Indigenous health worker, community health worker, maternal infant care worker, non-dental/oral health professional, oral health, oral hygiene, dental care, training/education program, oral/dental assessment, pregnant, antenatal, perinatal and assessment/screening tool.

Inclusion and exclusion criteria

For this review, we selected all articles published up to July 2017 relating to at least one of the research areas. Except for discussion papers, reviews and study protocols, research papers of all other study designs were included. No restrictions were placed on the quality or location of the study, however, studies which focussed on dental professionals promoting oral health among Indigenous pregnant women, and those not published in the English language were excluded.

Study selection and data extraction

The data were extracted from the selected studies and categorised under the following headings: author/study location; article type; aims; study design; intervention/program/screening tool; conclusion and focus area. These were subsequently categorised into the three focus areas corresponding to the research question. The first focus area investigated studies where IHWs undertook a role in promoting oral health among pregnant women. The second and third foci explored studies that described any oral health education/training programs and screening tools developed for IHWs in the antenatal setting. If the initial search across all three focus areas revealed limited or no studies, the search was expanded to IHWs promoting oral health in other settings and all non-dental health professionals involved in maternal oral healthcare (Fig. 1).

Results

Database searches yielded 1640 records. After 1405 duplicates and records screened by titles were excluded, 235 abstracts were screened for relevance; identifying 63 pertinent records. The full texts of the 63 papers were reviewed using inclusion and exclusion criteria. Three government-published documents were also included. Twenty-two articles were identified in this scoping review in relation to the potential role of IHWs in promoting oral health, training programs and potential oral health screening tools that can be used by IHWs for women during the antenatal period (Fig. 1). Studies were based in the United States ($n = 7$), Canada ($n = 2$), Australia ($n = 11$), Turkey ($n = 1$), and India ($n = 1$). These papers were clustered into three broad focus areas: i) role of IHWs in promoting maternal oral health ($n = 12$); ii) antenatal oral health training programs for IHWs ($n = 7$); and iii) potential antenatal oral health screening tools suitable for IHWs ($n = 5$) (Table 1).

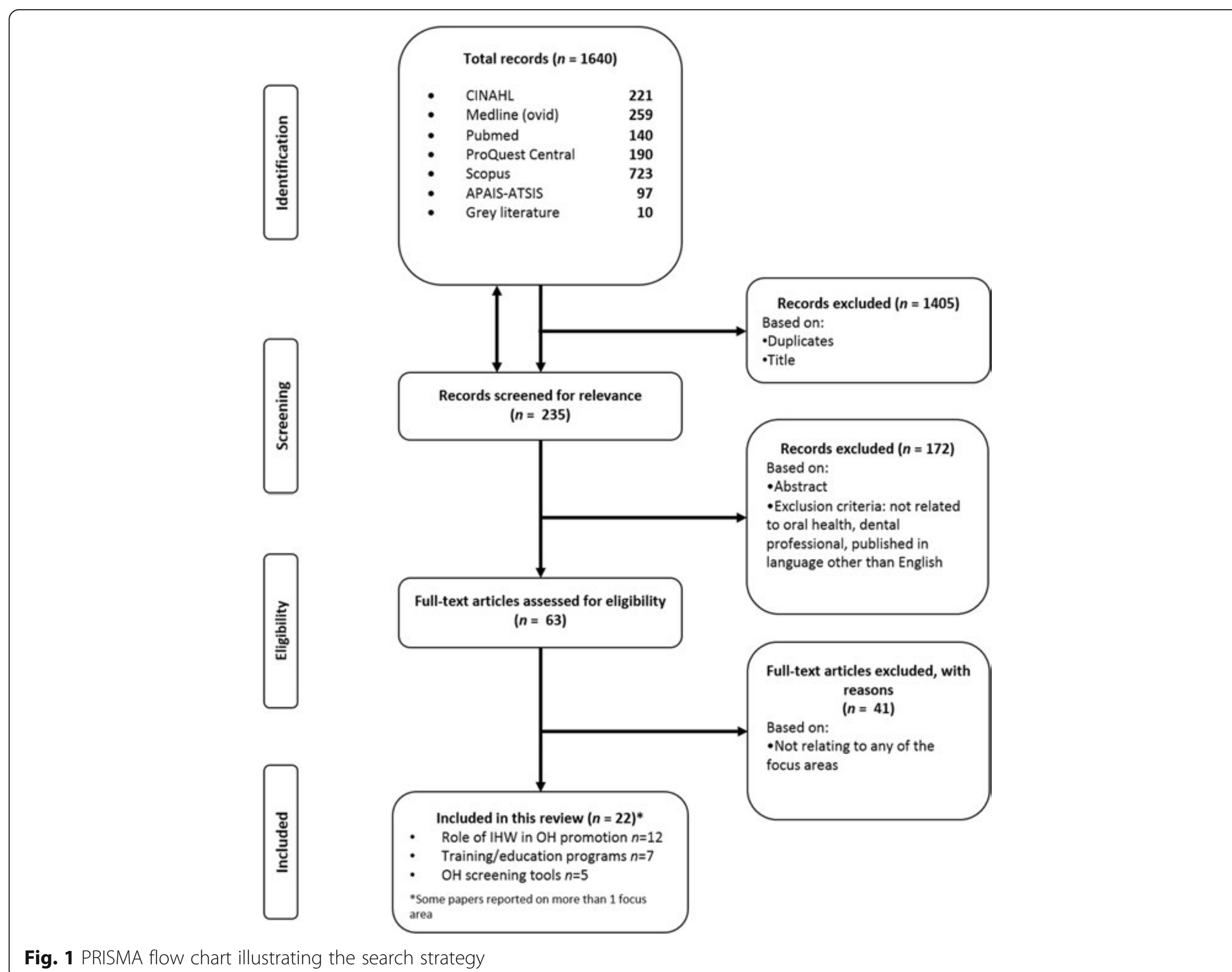

Fig. 1 PRISMA flow chart illustrating the search strategy

Focus area 1: Role of IHWs in promoting maternal oral health

Within this focus area, three categories of literature were identified that could inform the potential role of IHWs in promoting maternal oral health: i) IHWs who have promoted maternal oral health; ii) IHWs who have supported oral health across the lifespan; and iii) non-dental health professional who have promoted maternal oral health.

IHWs in promoting maternal oral health

Two articles identified the contribution of IHWs in promoting maternal oral health in an Australian [37] and Canadian context [38]. The Children's Oral Health Initiative (COHI) in Canada aimed to reduce rates of ECC among Indigenous communities through oral health promotion, screening and preventive dental treatment; IHWs were involved in scheduling dental appointments, applying the fluoride varnish and giving one-on-one oral health education to children, expectant mothers and parents in home-based visits. The Aboriginal Oral Health Program in South Australia [37] developed and streamlined, state referral pathway that involved health workers assessing and referring Australian Aboriginal and Torres Strait Islander pregnant women to dental services. Details of the assessment or their training was not described.

IHWs in supporting oral health across the lifespan

Five studies reported the role of IHWs in providing oral healthcare for Indigenous populations across the lifespan, ranging from early childhood (18 months to 5 years) to elderly [39–43]. Parker et al. [42] evaluated the implementation of a free Indigenous dental clinic in a remote Australian community. Although the roles of IHWs were not clearly defined, they were involved in program development and recruitment. This initiative was well received with a high demand over the year it was funded for implementation. The Dental Health Services in Victoria [41] published a brochure informing clients that free, public dental services were available for Indigenous Australians at a major dental hospital. Aboriginal liaison officers were

Table 1 Articles that relate to the potential role of IHWs in promoting maternal oral health

Author/Study Location	Article Type	Aims	Study Design	Intervention/Program/ Screening Tool	Conclusion	Focus Area
Adams et al., 2017 [44] United States	Peer-reviewed journal article	Evaluate effectiveness of a low-cost educational interven tion program in clinically improving oral health (OH)	Non-randomised controlled trial	Intervention: • CenteringPregnancy Oral Health Promotion program (delivered by midwives) • 3-h training course for midwives • Post-training practice session with feedback.	• Significant improvement in clinical OH outcomes as indicated by mean plaque index ($p < 0.001$), sites bleeding on probing ($p = 0.01$) & pocket depths ($p < 0.001$)	• Potential role of IHW • Training program
AIHW, 2011 [39] Australia	Government report	Reports on dental data collected from the Closing the Gap Child Oral Health Prevention and Promotion program in the Northern Territory (2009–2010)	N/A	Intervention: • Trained registered nurses and AHWs to apply fluoride varnish to at-risk children every 6 months • Child health checks, conducted by nurses/medical staff, for referrals and improving access to dental services	• Children who received a health check by nurses or medical staff, who also performed a Lift the Lip assessment, could be referred to the dental service for free • 37% of children (< 16 yrs) in the communities received a dental service	• Potential role of IHW
Braun et al., 2016 [40] United States	Peer-reviewed journal article	Assess effectiveness of an OH promotion program in reducing caries increment in Navajo children	Cluster-randomised trial	Intervention: • Community tribal members trained as community OH specialists • Delivered OH intervention in classrooms and to families	• Caries rate (including decayed, missing and filled surfaces): Nil significant change in children • Caregiver OH knowledge & behaviour: Rapid improvement after 1 year; no difference after 3 years between groups	• Potential role of IHW
Cibulka et al., 2011 [47] United States	Peer-reviewed journal article	To evaluate the effectiveness of advanced practice nurse model of care to improve the OH among low-income pregnant women	Randomised controlled trial	Intervention: • Video with discussion on OH conducted by nurses • Distributed an oral hygiene kit (toothbrush, fluoridated toothpaste and dental floss).	• No significant change in OH knowledge/perceptions of pregnant women between baseline and follow-up at 36 weeks • Improved OH practices (e.g. frequency of brushing and flossing teeth) and attendance for dental check-up during pregnancy • Reduced OH problems in 3rd trimester	• Potential role of IHW
Dental Health Services Victoria, 2017 [41] Australia	Government brochure	To provide culturally-appropriate information about available dental services for Aboriginal and Torres Strait Is lander peoples	N/A	Intervention: • Free dental services for any Aboriginal or Torres Strait Islander person at the Royal Dental Hospital of Melbourne	• Aboriginal Liaison Officer can assist with streamlining communication	• Potential role of IHW
Deshpande et al., 2015 [54] India	Peer-reviewed journal article	Assess the impact of the perinatal OH care education	Cross-sectional	Program:	• Significant improvement in OH knowledge ($p < 0.001$), & practice behaviour ($p < 0.001$)	• Training program

Table 1 Articles that relate to the potential role of IHWs in promoting maternal oral health *(Continued)*

Author/Study Location	Article Type	Aims	Study Design	Intervention/Program/ Screening Tool	Conclusion	Focus Area
		program on the knowledge, attitude & practice behaviour amongst gynaecologists		• Flip chart and OH resource brochures provided to 46 gynaecologists • Assessed after 1 month	• No significant change ($p = 0.49$) in attitude of respondents	
George et al., 2016 [52] Australia	Peer-reviewed journal article	Evaluate the effectiveness of the Midwifery Initiated OH (MIOH) program in improving the OH knowledge of midwives & assess their confidence to promote maternal OH post training	Pre-post test	Program: • Antenatal OH education and referral • 3 self-paced online modules over 3 months Delivered to 50 midwives	• Significantly improved midwives' knowledge ($p < 0.001$) • At program completion 82% of respondents were confident in introducing the topic of OH in their antenatal session, 77.6% were confident with dental service referrals, and 46% were confident to undertake a visual mouth check	• Training program
George et al., 2016 [56] Australia	Peer-reviewed journal article	Undertake sensitivity and specificity assessment of the maternal OH screening tool using two comparison approaches- the Oral Health Impact Profile and a clinical oral assessment by trained study dentists	Diagnostic test	Screening tool: 2-Item Maternal Oral Health Screening Tool administered by midwives 1. OH status 2. OH risk factors	• High sensitivity against the gold standards measured (93.3%, 88.2–97.9% CI) • Low specificity (20.5%, 13.2–27.8% CI) • Tool reliable to screen and refer women with OH problems to the dentist	• Screening tool
Hunter et al., 2011 [57] United States	Peer-reviewed journal article	Describe the OH status and OH practices of low-pregnant women in San Diego, California, and determine the needs for OH care education in this population	Descriptive correlational	Screening tool: 12-Item Oral Health Assessment Questionnaire administered by bilingual (English/Spanish-speaking) nurse-midwives 1. OH status 2. OH risk factors 3. Dietary risk factors	• Poor OH (prevalence of tooth decay was 45.9% and gingivitis was 36.7%) • Sample less likely to access dental services although had some good daily OH practices • Highlighted need for additional OH education	• Screening tool
Johnson et al., 2013 [45] Australia	Conference abstract	To evaluate the effectiveness of the midwifery-initiated oral health dental service (MIOH-DS) program in improving the uptake of dental services, quality of life and OH knowledge among pregnant women	Randomised controlled trial Three groups: 1) No intervention; 2) Midwifery Intervention (MIOH); and 3) Midwifery and dental intervention (MIOH-DS)	Intervention: • OH education, assessment and priority dental referrals during early pregnancy • Delivered by midwives	• 50% improvement in dental service uptake for participants who received the midwifery-initiated oral health dental service (MIOH-DS) intervention program • No significant difference between group receiving MIOH intervention and control group • Quality of life significantly improved in both intervention groups	• Potential role of IHW

Table 1 Articles that relate to the potential role of IHWs in promoting maternal oral health *(Continued)*

Author/Study Location	Article Type	Aims	Study Design	Intervention/Program/ Screening Tool	Conclusion	Focus Area
					• OH knowledge significantly improved for all 3 groups	
Lawrence et al., 2017 [48] Canada	Peer-reviewed journal article	Assess effectiveness of the Sioux Lookout Zone prenatal program on primary caregivers' dental preventive beliefs, behaviours and feeding habits of infants and toddlers	Longitudinal and cross-sectional approaches	Intervention: • One-on-one, culturally-appropriate, nutrition and OH preventive education • Woman-and-child nutrition educators visited caregivers in their homes	• High program coverage (> 70% community received intervention) had significantly improved dental knowledge ($p < 0.05$) and practices (e.g. toothbrushing frequency) • Over 90% of children were found to have early childhood caries despite changes in knowledge, beliefs and practices	• Potential role of IHW
Mathu-Muju et al., 2016 [38] Canada	Peer-reviewed journal article	To increase access to preventive dental services for First Nations and Inuit children living on federal reserves & in remote communities of Canada	Cross-sectional	Intervention: • Children's Oral Health Initiative (COHI) provided preventive dental care with culturally-appropriate OH messages • Dental therapists and hygienists collaborated with an Indigenous COHI aide	• Increased access of preventive dental services from 2006 to 2014 • Community capacity building with the employment of COHI aide was successful in improving access to preventive dental care. Approximately 50% of children living in the reserves participated in the OH initiative.	• Potential role of IHW
McGuire et al., 1998 [49] Australia	Peer-reviewed journal article	To describe the OH workshop targeting AHW (Aboriginal health worker) trainees in a remote community	Descriptive	Program: • OH program (2 day workshop) with 23 AHW trainees • Focussed on dental conditions, OH knowledge & education, prevention & treatments (fissure sealants, fluoride, oral hygiene products)	• Described as interactive, practical & engaging • Reported to be valuable for those in remote areas	• Training program
New York State Department of Health, 2006 [58] United States	Clinical practice guidelines	Develop clinical practice guidelines for health care professionals relating to OH care for pregnant women and young children	N/A	Screening tool: 2-Item questionnaire for initial prenatal screening administered by antenatal care provider 1. OH status 2. OH risk factors	• Discussed and outlined role of antenatal providers to integrate OH into maternal health	• Screening tool
Öcek et al., 2003 [53] Turkey	Peer-reviewed journal article	Evaluate the effectiveness of a dental health program for midwives working in primary health care services	Mixed-methods	Program: • Interactive OH educational program focussed on infants • Content based on pre-test assessment	• Improvement in OH knowledge among midwives (significance unreported) • Program perceived to be relevant to practice	• Training program

Table 1 Articles that relate to the potential role of IHWs in promoting maternal oral health *(Continued)*

Author/Study Location	Article Type	Aims	Study Design	Intervention/Program/ Screening Tool	Conclusion	Focus Area
				• Program delivered to 164 midwives		
Oral Health Care During Pregnancy Expert Workgroup, 2012 [22] United States	National consensus statement	Developed to assist health professionals, program administrators and staff, policymakers, advocates, and other stakeholders respond to the need for improvements in the provision of OH services to women during pregnancy	N/A	Screening tool: 4-Item oral health questionnaire adminis tered by prenatal healthcare professionals 1. OH status 2. OH risk factors 3. Visual inspection	• Questionnaire developed from a national expert panel coordinated by the National Maternal and Child Oral Health Resource Center	• Screening tool
Pacza et al., 2001 [51] Australia	Peer-reviewed journal article	Institute a culturally appropriate preventative OH program at a community level	Descriptive survey	Program: • Pilot OH training program for 27 AHWs in a rural and remote community • 3 modules over 96 h (36 h in the classroom; 60 h on-the-job)	• Material was relevant & enjoyable • Difficulty was moderate • Students perceived they had a good understanding of module objectives and relevant to their needs.	• Training program
Parker et al., 2005 [42] Australia	Peer-reviewed journal article	Describe the development, implementation and evaluation of the first stage of the OH Program (dental clinic/ service) for the Indigenous community serviced by Pika Wiya Health Service	Descriptive	Intervention: • Rural OH service designed to meet cultural needs of the Indigenous population • Recruited an AHW to coordinate for administrative duties and establishing the program	• High service demand in 1 year (229 individuals, 1582 treatments) • AHW involved in program development, health promotion & recruitment	• Potential role of IHW
Slade et al., 2011 [43] Australia	Peer-reviewed journal article	To evaluate effectiveness of trained primary healthcare workers in preventing dental caries in preschool children living in remote Aboriginal communities in Northern Territory	Cluster-randomised, concurrent controlled trial	Intervention: • Nurses and/or AHWs applied fluoride varnish on children, advised parents on caries prevention, promoted traditional health, demonstrated OH practices • Engaged members of community during events.	• Intervention consisting of fluoride varnish & OH promotion reduced caries by 24–36%	• Potential role of IHW
Smith et el., 2016 [50] Australia	Peer-reviewed journal article	To evaluate the OH training program targeting AHWs in cultural appropriateness, course content and respondents' perception of competence to offer OH advice	Qualitative	Program: • Smiles not Tears OH programme (1 day with presentation, role-play & group discussion) • Delivered to 61 AHWs educating about OH for young children	• Increased AHWs' confidence to offer dental advice to target population • Course received positive feedback in content and perceived to be culturally appropriate	• Training program
South Australia Dental Service, 2015 [37] Australia	Business Plan	Improve oral health outcomes for eligible Aboriginal and Torres Strait Islander people in	N/A	Intervention: • Aboriginal Oral Health Program trained Health	• Outlined seven key performance indicator	• Potential role of IHW

Table 1 Articles that relate to the potential role of IHWs in promoting maternal oral health *(Continued)*

Author/Study Location	Article Type	Aims	Study Design	Intervention/Program/ Screening Tool	Conclusion	Focus Area
		South Australia by increasing the number who access mainstream dental services		Workers to assess, refer adults, children, and pregnant women to dental services • Developed a streamline referral pathway for pregnant women	objectives and corresponding actions/strategies	
Stevens et al., 2007 [46] United States	Peer-reviewed journal article	Describe strategies used by one adolescent pregnancy program to implement New York State Department of Health (NYSDOH) OH guidelines	Descriptive	Intervention: • Nurse midwives and a nurse practitioner educated, assessed and referred patients to dental services Screening Tool: Two-item questionnaire (NYSDOH 2006)	• Dental risks screening, referrals, education & regular dental care were vital to program • Nurses were “driving force” for OH promotion; they led the screening, assessment & education	• Potential role of IHW • Screening tool

featured as contact personnel to assist in brokering and accessing services. The Australian Institute of Health and Welfare [39] reported that IHWs applied fluoride varnish on children within communities in the Northern Territory and assisted in contacting families as part of the national health campaign, Close the Gap. Among the communities targeted, 37% of children received a dental service. One Australian [43] and one cluster-randomised trial in the United States [40] also trained IHWs or community tribal members to deliver oral health education and fluoride varnish applications at preschools and within Indigenous communities, respectively. Slade et al. [43] trained Indigenous Australian health workers to assess and refer preschool children with dental decay, and reported reduced incidence of dental caries. No significant change to the children's oral health status as measured by the number of decayed, missing or filled surfaces was reported in the study conducted in the United States [40].

Non-dental health professionals in supporting maternal oral health

Five studies were identified that described the role of non-dental health professionals in promoting maternal oral health, including midwives [44, 45], nurses practitioners [46], advance practice nurses [47] and maternal and child nutrition educators [48]. Two studies involving midwives discussed oral health topics with pregnant women, including demonstrating proper oral hygiene techniques, performing oral health screening and providing priority referrals to dental services. In these studies significant improvements were observed in clinical oral health outcomes [44], dental service uptake, self-reported quality of oral health and oral health knowledge of pregnant women. The oral health knowledge and confidence of midwives to promote oral health also showed marked improvement [45]. The New York State Department of Health oral health guidelines, implemented by Stevens et al. [46], described the use of midwives and nurse practitioners to provide oral health screening, education and referrals to dental services; nonetheless, effectiveness of the program was not reported. Another study employed advance practice nurses to improve oral health of low-income pregnant women in the United States. Although this program did not significantly improve women's knowledge, significant improvements in oral health practices and dental service uptake were reported, as well as a reduction in the rates of oral health problems in late pregnancy [47]. Oral health practices were also improved in Canada where maternal and child nutrition educators provided one-on-one dental preventive education to the whole community, including pregnant women [48]. Despite improvements in practice, the prevalence of ECC remained high.

Focus area 2: Antenatal oral health training programs for IHWs

Within focus area 2, three categories of literature were identified that could inform the training programs for IHWs: i) IHWs training programs to promote maternal oral health; ii) IHWs training programs to support oral health across the lifespan; and iii) training programs for non-dental health professionals in promoting maternal oral health.

IHWs training programs to promote maternal oral health

Mathu-Muju et al. [38] briefly described a Canadian government-initiated training program (COHI) for IHWs to enable them to provide oral health education primarily for children, parents, caregivers, but also for expectant mothers. IHWs were trained in five areas not specifically defined in the study.

IHWs training programs to support oral health across the lifespan

This scoping review identified four Australian-based studies reporting different oral health training programs for IHWs to support Indigenous populations across the lifespan [43, 49, 50]. Two of the programs were introduced specifically to address the needs of communities in rural and remote areas [51]. Pacza et al. [51] in consultation with stakeholders from the local Indigenous medical service developed a three-module training program delivered in a classroom in addition to 60 h of on-the-job training. The modules covered an introduction to dental health and knowledge, applied oral health, and application to their local community. Another two studies delivered training through a one or 2 day workshop including education on oral health, oral hygiene and preventive treatments, emphasising the IHWs' utilisation of role-play, which received positive feedback [49, 50]. Smith et al. [50] also trained IHWs to use an early childhood oral health screening tool. Finally, one study [43] involved training IHWs to reduce ECC incidence through oral disease recognition, referral to dental services, oral health promotion, fluoride varnish application, provision of chart books and DVD instructions; however, mode of delivery and evaluation were not clearly described.

Training programs for non-dental health professionals in promoting maternal oral health

The search yielded four articles reporting training programs in promoting maternal oral health to non-dental health professionals including midwives [44, 52, 53] and gynaecologists [54]. Two of these studies delivered face-to-face oral health education and promotion programs [44, 53] while the other two employed an online self-paced module [52] and written material [54] as the delivery mode of training activities. Öcek et al.'s program in Turkey [53]

increased oral health knowledge of midwives through a face-to-face program involving oral hygiene procedures, techniques, and eruption chronology of deciduous teeth in young children. Adams et al. [44] did not include an evaluation report, however, their face-to-face training in the United States for midwives included education on the importance of maternal oral health and dental care during pregnancy and instructions on oral health promoting practices including flossing and tooth-brushing, and was developed to be integrated into pre-existing antenatal sessions. George et al. [52] delivered and evaluated an online self-paced three-module program designed with theoretical and practical oral health content for midwives in Australia. The modules enhanced antenatal oral health knowledge, and also trained midwives to use an antenatal oral health screening tool which assisted their referrals to dental services. Deshpande et al. [54] also demonstrated an improvement in oral health knowledge with gynaecologists in India by means of a flip-chart and oral health brochures.

Focus area 3: Antenatal oral health screening tools developed for IHWs

This scoping review could not identify any oral health screening tools developed specifically for IHWs in any setting. Nevertheless, there is one Australian report of IHWs being able to utilise an existing early childhood oral health screening tool, ubiquitously known as 'Lift the Lip', to identify ECC through a combination of parental concern and visual inspection [50]. IHWs could refer appropriately during a role-play demonstration, and reported the tool to be culturally acceptable. This resource has also been adapted for Australian Aboriginal and Torres Strait Islander families, and renamed as 'See My Smile' [55].

Five papers were identified that described an antenatal oral health screening tool for non-dental health professionals [22, 46, 56–58]. A descriptive study in the United States provided the 12-item oral health questionnaire which was utilised by bilingual nurse midwives [57]. The questionnaire was assessed for cultural relevancy and currency by six pregnant women prior to its administration. The items identified the patient's health-seeking behaviours including dental service uptake, oral health status such as dental or gum pain, and risk factors such as vomiting frequency. Furthermore, a national consensus statement in the United States proposed a four item oral health questionnaire to be used by prenatal healthcare professionals [22]. This tool similarly aimed to identify oral health status, oral health risk factors and health-seeking behaviours. Another shorter screening tool developed for antenatal care providers, consisting of two items focusing on identifying oral health problems and visits to the dentist in the previous 6 months, was published in the New York State Department of Health [58] clinical guidelines. Stevens et al. [46] demonstrated that nurse midwives and nurse practitioners were able to utilise this screening tool, but no formal evaluation was conducted. An almost identical two-item screening tool assessing whether the pregnant woman had any dental problems, and whether they have visited a dentist in the last 12 months was developed and evaluated for midwives in Australia [56]. This tool was validated against two gold-standard assessments: a clinical evaluation by trained dentists and a subjective oral health assessment. It demonstrated high sensitivity in detecting women who required a dental visit.

Discussion

A review of the literature indicated that some IHWs have had roles in improving oral health outcomes of pregnant women, particularly in South Australia. However, there are currently no 'proof of concept' interventions, training programs or screening tools that can provide IHWs with the knowledge and skills to promote maternal oral health and refer pregnant women appropriately to dental services. While one study by Mathu-Muju et al. [38] trained IHWs to promote oral health among pregnant women, it focussed on reducing rates of ECC in children.

Although there is some evidence of maternal oral health training programs and screening tools available for non-dental health professionals, certain issues require consideration prior to their use by IHWs. An important factor to consider is whether these interventions are culturally appropriate. Kreuter and colleagues [59] identified cultural appropriateness to be an essential element in interventions for Indigenous populations to reflect their unique health values, practices and behaviours. Another factor is that these programs were designed for individuals with a specific skill set to undertake oral assessments and provide oral health education. Consequently, there may be an incongruity between the educational background of IHWs and the clinical care requirements of these programs. For instance, some of the programs and tools were designed for midwives, nurses or other health professionals who typically complete tertiary level education [60]. However, in Australia, IHWs may not necessarily have the same degree of educational qualification as many complete vocational education only [61].

Despite this, a university-level education may not be a necessary pre-requisite to raise oral health awareness or to provide clinical care. In Australia, the United States and Canada, IHWs encouraged oral health within communities and played integral roles in applying fluoride varnish [38, 40, 43, 49]. Various other studies have similarly demonstrated the key role of an IHW in breaking

down barriers and bridging the gap in other health-care settings. In the Australian state, Victoria, an Aboriginal liaison officer was the key contact through whom communities could choose to engage with the service [41]. They have also acted as a foundational support and conduit in the provision of care in mental health and cardiovascular settings where they developed mental health knowledge and assessment skills; improved Indigenous people's transition to mental health services; and more effectively delivered cardiovascular health education and care in hospitals with the expertise of other health professionals [62–64]. These studies highlight the capacity of IHWs to educate, assess and assist pregnant women to navigate through the healthcare system.

The literature also emphasises their role in brokering between communities and other healthcare professionals, including services with GPs, midwives, nurses and dentists. Walker and colleagues [65] explored the perspectives of health personnel, excluding IHWs, on the oral health role of IHWs. Their findings demonstrated that dental and non-dental health personnel perceived IHWs to be in an important position to effectively promote oral health within their communities. Another study conducted with IHWs suggested that appropriate oral health training should be given by a team of IHWs and dentists to relay the relevant information to IHWs [66]. They also highlighted that training needed to be adopted by the team and that there should be adequate management support.

Models of care that enable effective partnerships between Indigenous women and IHWs, and that focus on continuity of care ensure that cultural needs are respected during this transition into parenthood. IHWs are integral to these partnerships as they share the same "language" as their community which facilitates effective communication [67]. This common language encourages compliance to interventions and uptake of available health services, including dental services, within the healthcare system [29, 68]. Having the same language, fosters a relationship where patients feel a sense of empowerment and feel included in decision-making during the perinatal period, which further enhances self-efficacy [69]. Conway and colleagues [70] attributed the success of their program, which aimed to provide holistic, patient-centred chronic care management to Indigenous Australians, to its focus on the patient's story; providing patients the opportunity to make decisions about their own health.

Another important aspect in developing models of care in this area is to ensure the Aboriginal community is ready to receive oral health information from AHWs. One way of addressing this is to use motivational interviewing (MI). MI is a client-centred counselling intervention designed to elicit intrinsic behavioural change [71]. MI techniques have demonstrated significant effectiveness in improving health outcomes including blood pressure, cholesterol and body mass index [72].

Lastly, for effective transitional care and effective partnership models of care, there needs to be adequate support from the healthcare system. This may require organisational changes and sufficient resources and personnel to enact change [73, 74]. In Australia, free dental care generally is available through the public healthcare system for adults with low income. Although eligibility may not be conditional to Aboriginal and Torres Strait Islander status depending on the state, these individuals receive priority access [75]. Despite priority access, a high proportion of Aboriginal and Torres Strait Islander Australians do not regularly attend a dental service [76]. Campbell and colleagues [77] identified several barriers which can affect their access to health services which include long waiting times, distance, lack of transportation and previous experiences of racism. The lack of recruitment of Aboriginal and Torres Strait Islander staff in the healthcare system is another cited problem. It is recognised that to consolidate the Aboriginal health workforce requires specific support for the challenges they are likely to face including racism, community responsibilities, family issues, sense of isolation and stress and poor education [78]. To improve access, some Aboriginal Health Services, which provide free healthcare to their communities, are funded to provide dental care [75]. However, as not all Aboriginal Health Services receive funding for dental care, it is important to explore strategies to increase the number of Aboriginal and Torres Strait Islander dental staff and link their community to public dental services. The literature has shown great potential for capacity building IHWs to provide culturally-appropriate oral healthcare and referral to dental services within the healthcare system for pregnant women with adequate organisational support and resources.

There were a number of limitations in this review that need to be acknowledged. The strength of the evidence of the intervention studies which included IHWs were poor based on their study design quality [79] while the grey literature included may not necessarily be critically peer-reviewed. Post-hoc analyses were frequently utilised in studies and few conducted significance testing. A possible explanation for this might be associated with the challenges of developing culturally-appropriate training programs and tools since considerable time may be necessary to negotiate and build partnerships with Indigenous communities [32]. There is also the ethical challenge of conducting rigorous research while ensuring that healthcare is not compromised for this vulnerable population. It was also difficult to define the role of IHWs from country to country which therefore limited comparisons. Further, there was a paucity of evidence comparing Indigenous populations with other disadvantaged groups, which may be a more useful comparison in identifying sociocultural barriers in future studies.

Recommendations

Capacity building IHWs in maternal oral health requires both change to policy and practice. A structured framework incorporating organisational change and the allocation of sufficient resources may need to be implemented to strengthen oral health referral pathways from antenatal settings. Oral health interventions and protocols should be developed in partnership with IHWs to ensure training programs and tools are validated, pragmatic, culturally appropriate, easy to use, and accommodate continuity of care. Further, to address the needs of IHWs in both urban and remote areas, training programs may need to be designed to train-the-trainer or to adopt telehealth models.

Conclusions

IHWs over the globe have had some role in promoting oral health in the antenatal setting. Further work is necessary, however, to develop validated antenatal oral health training programs and screening assessment tools that respect Indigenous cultural values. More importantly, models of care that demonstrate and foster mutual partnerships that assist Indigenous peoples in accessing dental care require further research for implementation across the population.

Abbreviations

AHW: Aboriginal health worker; COHI: Children's Oral Health Initiative; ECC: Early childhood caries; IHW: Indigenous health worker; MeSH: Medical Subject Headings; MIOH: Midwifery initiated oral health; MIOH-DS: Midwifery initiated oral health dental service; OH: Oral health

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Chapter 4: Research Gaps, Aims & Conceptual Framework

4.1 Overview

This chapter will identify the research gaps, as well as reiterate the study aims and research questions. An outline of the thesis and the conceptual framework that will underpin the study's methodology will also be described.

4.2 Research Gaps

The background chapters identified numerous gaps relating to oral health promotion among Australian Aboriginal and Torres Strait Islander women, as well as Indigenous women around the world during pregnancy. Experiences of pregnant women in relation to oral health have been well explored in the literature. However, little attention has been given to the in-depth oral health experiences and perspectives of Indigenous pregnant women globally despite experiencing generally poorer health outcomes compared to non-Indigenous women. In Australia, pregnancy guidelines explicitly support antenatal care providers, like midwives and AHWs, in the role of oral health promotion. However, there is a lack of oral health programs specifically developed to support Aboriginal health staff, including AHWs and FPWs, to promote oral health during pregnancy. In addition, none of the existing training programs or oral health screening tools designed to promote oral health during pregnancy have been developed in collaboration with Aboriginal health staff or Aboriginal and Torres Strait Islander pregnant women to inform a culturally safe model of care. In Australia, the perspectives of Aboriginal health staff in promoting oral health among Aboriginal and Torres Strait Islander pregnant women have not been explored. Thus, there is the need to develop an antenatal oral health model of care and pilot test it, in collaboration with Aboriginal health staff and Aboriginal and Torres Strait Islander women, to better address the needs of Aboriginal and Torres Strait Islander women during pregnancy.

4.3 Research Aims and Questions

The aim of this study was to develop and pilot test an evidence-based and culturally appropriate model of care to promote oral health among Australian Aboriginal and Torres Strait Islander pregnant women by capacity building Aboriginal health staff. The specific research objectives were to:

6. Gather evidence relating to oral health knowledge, practices, attitudes, and challenges of Indigenous pregnant women globally (Chapter 2)
7. Gather evidence on the potential role of Aboriginal and other Indigenous health workers in promoting oral health among pregnant women worldwide (Chapter 3)
8. Explore the perspectives of Aboriginal health staff in promoting oral health among pregnant women and gain their insights into the development of a culturally safe antenatal oral health model of care (Chapter 7)
9. Investigate Australian Aboriginal and Torres Strait Islander women's experiences and perceptions of oral health during pregnancy to inform the development of a culturally safe antenatal oral health model of care (Chapter 8)
10. Develop and pilot test a culturally safe antenatal oral health model of care, specifically for Aboriginal women during pregnancy (Chapter 9).

Table 2 outlines the study objectives and questions, and where these are addressed in the publications embedded within the thesis.

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Table 2 *Aligning Objectives with Study Questions and Published Results*

Objectives	Study Questions	Thesis Papers
1. Gather evidence relating to oral health knowledge, practices, attitudes, and challenges of Indigenous pregnant women globally	• What is the oral health knowledge, attitudes, practices, and challenges that impact Indigenous women during pregnancy globally?	**Paper 1:** Oral health knowledge, attitudes, practices, and challenges of Indigenous pregnant women: a mixed systematic review
2. Gather evidence on the potential role of Indigenous health workers in promoting oral health among pregnant women worldwide	• What are the existing roles of Indigenous health workers globally in promoting oral health among pregnant women? • What training programs or screening tools, designed to promote antenatal oral health, have been developed and evaluated specifically for Indigenous health workers?	**Paper 2:** The role of Indigenous health workers in promoting oral health during pregnancy: A scoping review
3. Explore the perspectives of Aboriginal health staff in promoting oral health among pregnant women and gain their insights into the development of a culturally safe antenatal oral health model of care	• What are the experiences and perceptions of Aboriginal health staff, specifically AHWs and FPWs, and Aboriginal management staff, towards oral health care for women during pregnancy?	**Paper 3:** "Got to build that trust": The perspectives and experiences of Aboriginal health staff on maternal oral health
4. Investigate Australian Aboriginal and Torres Strait Islander women's experiences and perceptions of oral health during pregnancy to inform the development of a culturally safe antenatal oral health model of care	• What are the experiences and perceptions of Aboriginal and Torres Strait Islander women towards oral health care during pregnancy?	**Paper 4:** A qualitative study exploring the experiences and perspectives of Australian Aboriginal women on oral health during pregnancy
5. Develop and pilot test a culturally safe antenatal oral health model of care specific to Aboriginal and Torres Strait Islander women during pregnancy	• What is the acceptability, satisfaction, and recommendations of the developed model of care among AHWs, and what were the changes in oral health knowledge and confidence following the pilot?	**Paper 5:** Aboriginal Health Workers promoting oral health among Aboriginal and Torres Strait Islander women during pregnancy: Development and pilot testing of the Grinnin' Up Mums & Bubs program

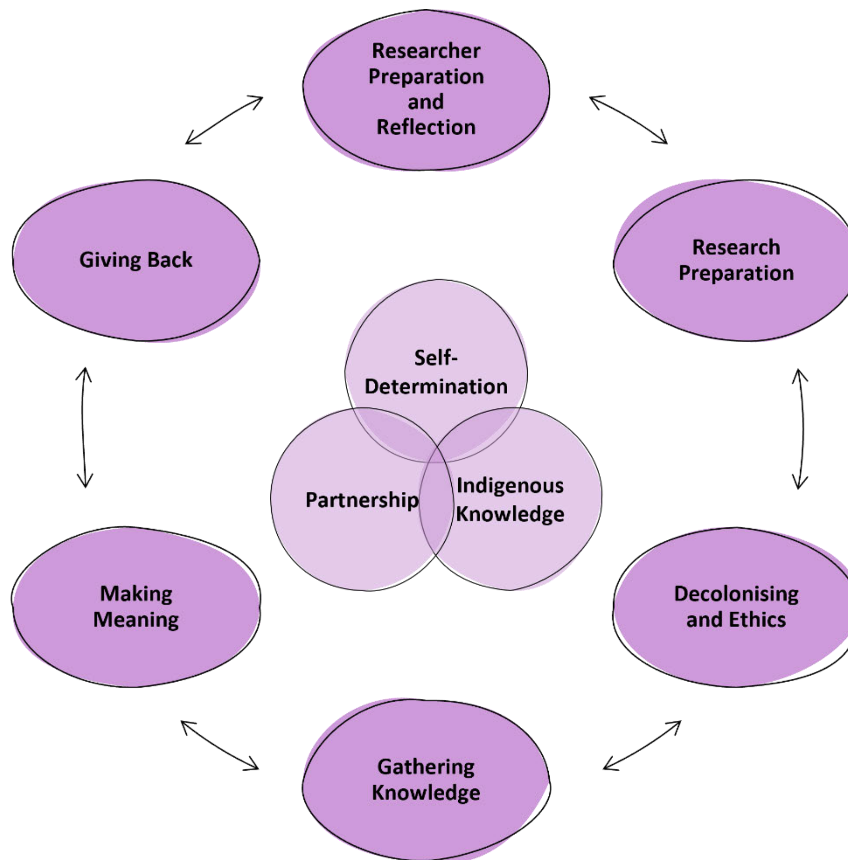
4.4 A Conceptual Framework for the Grinnin' Up Mums & Bubs Study

The key to developing a culturally appropriate intervention was to use an approach that facilitated the generation of Aboriginal and Torres Strait Islander knowledge and follow culturally appropriate ways of conducting research. Participatory Action Research (PAR) is a type of action research that emerged during the mid to late 20th century primarily in developing nations; however, it also has roots in Indigenous history.[128] PAR is a reflective and collaborative form of research where research investigators and community members work together to understand and address specific challenges or problems that are important to the community members.[129, 130] This approach involves acquiring a collective understanding of the historical, cultural and social contexts to implement direct social action.[129]

Maggie Kovach, a Canadian Aboriginal scholar, recognised that PAR would provide a platform for research that would be culturally safe.[131] A conceptual framework, adopted from Kovach's model for PAR, was employed to support the Grinnin' Up Mums & Bubs study. The proposed framework (Figure 6) embeds the key principles and strengths of PAR.

As this project was led by a non-Indigenous researcher, various elements of the framework were modified. At the centre of the framework are three overlapping keystone principles of self-determination, partnership and privileging of Indigenous knowledges. These interlinking keystones were not included in Kovach's original framework. These keystones were identified after the candidate yarned with the Aboriginal health staff about how they would like to collaborate on the project.

Figure 6 *Conceptual Framework Underpinning the Participatory Action Research Process of the Grinnin' Up Mums & Bubs Study*



Self-Determination, referring to the rights of peoples to be able to freely determine and pursue economic, social and cultural development,[132] was a principle keystone that emphasised the need for Aboriginal and Torres Strait Islander peoples to be actively involved in key decision making throughout the research. It is important to observe that self-determination is a right claimed by a group of peoples, and not individuals,[133] implying that Aboriginal and Torres Strait Islander peoples are a distinct group within Australia who require power for decision-making within their own communities. While the name for this specific keystone was not explicitly identified with the Aboriginal health staff, integrating self-determination within the framework would allow for the Aboriginal health staff to conceptualise and direct the conduct of the research as well as the interpretation and implementation of the research findings.

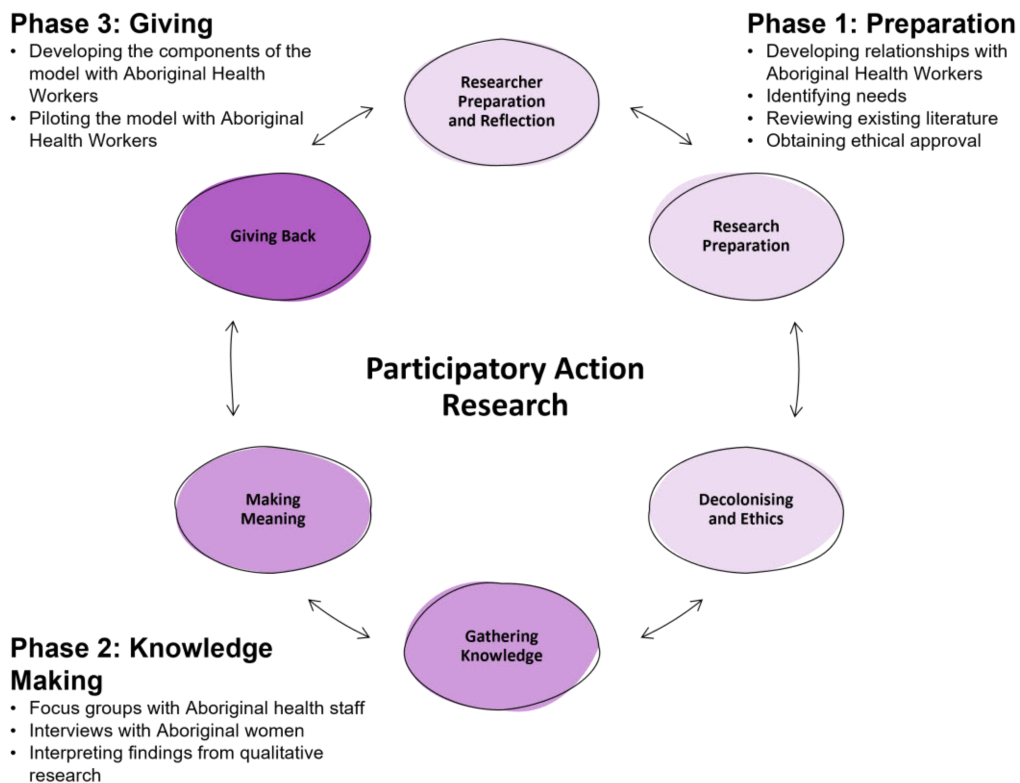
The next keystone, *Partnership*, was imperative to the conceptual framework and philosophy so that there would be a platform for community members to drive the research. The need for this keystone arose while the candidate yarned with the Aboriginal health staff. The staff identified the need to partner and collaborate on the project, and also negotiated their involvement on the project. Specifically, the Aboriginal health staff identified how they wanted to be involved at each stage of the research process so that they would not be overly burdened by the partnership, while still being involved in the key decision making, generation of research and development of an intervention. Baum et al. [129], who wrote a seminal piece on PAR, highlighted that the partnerships between researchers and the community should be explored and negotiated. While partnerships need to actively involve participants as researchers, participating communities should be able to stipulate parameters around involvement. In Australia, for example, Aboriginal health staff such as AHWs typically have large workloads with often last-minute changes to scheduling[134]; thus, inflexible requirements to research involvement may be counterproductive to fostering positive experiences and relationships with Aboriginal and Torres Strait Islander communities. Therefore, negotiation on defining partnership needs to be established prior to the research.

Finally, the third interlinking keystone, *Indigenous Knowledge*, emphasises the need for Aboriginal and Torres Strait Islander peoples to inform the research process, including the content, methods and outcomes. Indigenous research methods have long existed within Indigenous communities around the world to support and cultivate Indigenous ways of knowing, being and doing.[128] In this study, the Aboriginal health staff discussed strategies where Indigenous knowledges could inform the research, specifically through focus groups with Aboriginal health staff who had experience in Aboriginal and Torres Strait Islander antenatal health, and interviews with Aboriginal and Torres Strait Islander pregnant women

and mothers. Combining the three keystones was strategic in ensuring that the research process and outcomes aligned with culturally safe ways of knowing, being and doing.

In the proposed framework, there are six other concepts encompassing the three keystones. The processes that surround the three overlapping keystones indicate the important protocols that will guide the research methods, and are derived from the Indigenous methodological framework proposed by Kovach [131]. Bidirectional arrows without a definitive start or end point were included to demonstrate the fluidity that underscores the cyclical, rather than linear, nature of PAR. While there were some defined steps at certain points of the research, sometimes it was necessary to go "back" or "forward" a step. The research methods following this conceptual framework were categorised into three phases (Figure 7): Phase 1 (Preparation); Phase 2 (Knowledge Making); and Phase 3 (Giving). The following section provides additional explanation of the various processes involved in the conceptual framework.

***Figure 7** Phases Within the Conceptual Framework*



4.4.1 Phase 1: Preparation

Researcher Preparation and Reflection is important for the candidate who, as a non-Indigenous researcher, needed to continually reflect and maintain reflexivity. This was an ongoing process involving writing journal entries over the course of the study and building relationships with both Aboriginal and Torres Strait Islander and non-Indigenous peoples. These relationships offered opportunities to yarn about experiences, the challenges encountered, as well as learning and being respectful of different cultural protocols.

Research Preparation involved conceptualising the study design and the research methods for the study through informal discussions with the Aboriginal health staff who participated in the gathering of knowledge. This occurred during the earlier stages of the study, and also included the gathering of knowledge from the literature (Chapters 2 and 3).

Integrating *Decolonising and Ethics* into the research was also a necessary step in working towards a meaningful and emancipatory outcome for Aboriginal and Torres Strait Islander peoples by renegotiating the balance of power and control between the researcher and the community compared to more traditional approaches to research. In this study, the candidate engaged with decolonisation by learning about the history of imperialist-driven colonisation and how this has affected Aboriginal and Torres Strait Islander peoples.[135] This process overlapped with *Researcher Preparation and Reflection*, and required an ongoing process and reflection to see and value Indigenous knowledges, worldviews and social and cultural values.[136] As part of ethics, both Aboriginal and Torres Strait Islander and non-Indigenous human research ethics committees reviewed and approved the ethical conduct of the study based on ethical guidelines and recommendations.[137, 138] Furthermore, informal yarning with Aboriginal and Torres Strait Islander co-supervisors, researchers and stakeholders ensured that certain ethical principles would be followed, including that the research would align with their values, that participants' voices would be authentically represented, and that the research would provide tangible benefits to the community.

4.4.2 Phase 2: Knowledge Making

Gathering Knowledge occurred informally through contact with Aboriginal health staff, the Aboriginal action group (further discussed in Chapter 5), and various additional Aboriginal and Torres Strait Islander peoples. Knowledge was also gathered formally through focus groups with Aboriginal health staff and interviews with Aboriginal pregnant women and mothers.

Interpretation and *Making Meaning* of the knowledge gathered was conducted primarily during the interviews and focus groups. The knowledge gathered was synthesised to identify the potential oral health needs and perspectives of Aboriginal and Torres Strait Islander women, and to inform the development of the oral health model of care. The

interpretation of the knowledge generated was framed through the cultural lens of Aboriginal and Torres Strait Islander researchers, community members, as well as non-Indigenous researchers.

4.4.3 Phase 3: Giving

Giving Back, which constitutes Phase 3 of the conceptual framework, was the process of developing the components of the model of care, as well as piloting the model. The components of the model may be recognised as the tangible outcomes of the study to the Aboriginal and Torres Strait Islander stakeholders involved in the study. Less tangibly, giving back is also an ongoing process involving the giving back of power to Aboriginal and Torres Strait Islander community members to direct the development of the intervention in partnership with the research team. The developed and piloted model of care was designed to be owned by the community in a joint partnership.

4.5 Summary

This chapter described the research gaps, overall aim of the study, and identified specific research aims and questions and where these will be addressed within the thesis. The conceptual framework that has guided the Grinnin' Up Mums & Bubs study has also been outlined in this chapter. The following chapter will explore the study's methodology.

Chapter 5: Methodology

5.1 Overview

This chapter will be reporting on how the PAR methodology will be supported by an underpinning Indigenous paradigm, along with its assumptions, followed by considerations on positionality. This chapter will also consider potential strategies that could enhance the involvement of Aboriginal and Torres Strait Islander peoples throughout the research.

5.2 Considerations with Choosing an Appropriate Paradigm

Paradigm refers to an individual's beliefs about the world and the nature of knowledge. A paradigm also directs how these beliefs influence and guide how a person may choose to conduct research to gain new knowledge.[139] Non-Indigenous, specifically Western, ways of knowing and doing have historically monopolised the domain of 'legitimate' knowledge and research methods. These paradigms reflect and prioritise Western values and perspectives.[19] Consequently, there is the risk of misapplication of these paradigms when conducting research with Australian Aboriginal and Torres Strait Islander communities. Western research methods have a repute of researching *on*, instead of collaborating *with*, Indigenous peoples across the globe.[140] The former approach of research conducts research without the input of the community. Without research collaboration *with* the Indigenous community of interest, the knowledge that is gathered is likely to underpin non-Indigenous interests which can then perpetuate disempowerment.[19, 131, 141]

As the aim of the Grinnin' Up Mums & Bubs study was to develop an oral health model of care for Aboriginal and Torres Strait Islander women by capacity building Aboriginal health staff, there was the potential for a myriad of problems to arise if Aboriginal health staff as well as Aboriginal and Torres Strait Islander women were not involved throughout the research process. The primary problem is one of validity. If the identified research problem was not relevant to the perspectives of Aboriginal and Torres Strait Islander

women or health staff, then conducting research to resolve the 'problem' would be misaimed. The notoriety of research that has resulted in little to no perceptible benefit among Aboriginal and Torres Strait Islander peoples has led to the notion that Aboriginal and Torres Strait Islander peoples 'are the most researched people in the world'.[140] This observation has likely culminated from experiences where research involvement has accomplished an insignificant change in the lives of Aboriginal and Torres Strait Islander peoples, contributing to resistance to research. This was an initial challenge for the present study.

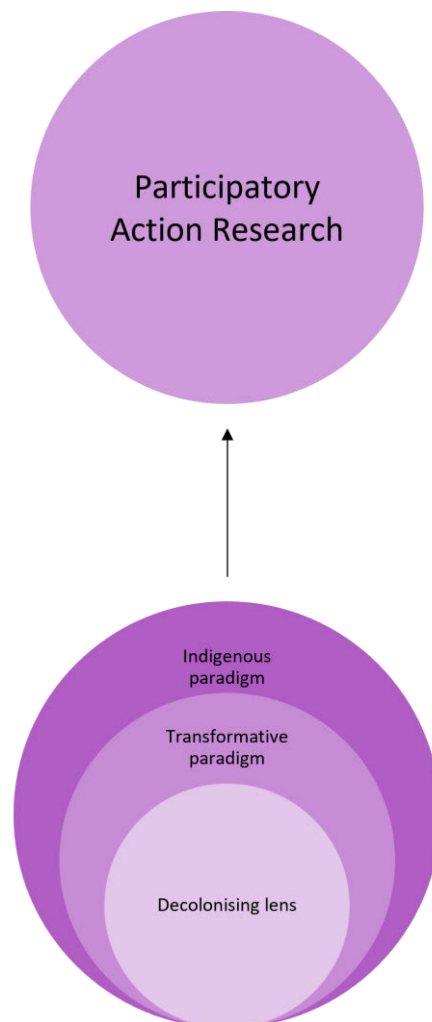
5.3 Adopting an Indigenous Paradigm

The limitations associated with traditional Western paradigms necessitate a shift towards conducting research using an Indigenous paradigm. Indigenous paradigms centre on Indigenous knowledge,[142] and aim to acquire new knowledge without perpetuating oppression of Indigenous peoples.[19, 131, 143] Thus, an Indigenous paradigm may be described as one that aligns with Indigenous ontology, epistemology, axiology, methodology, and recognises Indigenous ways of knowing, being and doing.[144] Indigenous peoples around the world possess distinct characteristics and unique perspectives; thus, there cannot be a universal Indigenous paradigm. However, this term may be used to highlight the similarities in values or experiences of Indigenous peoples, particularly in relation to colonisation.[19]

It is important to point out that paradigms that were specific to Australian Aboriginal and Torres Strait Islander research were considered. One of the main paradigms that were considered was the Indigenous Standpoint Theory, which would have been appropriate for use in this project as it focuses on issues that concern Aboriginal and Torres Strait Islander peoples, and first works to benefit Aboriginal and Torres Strait Islander peoples.[145] Nevertheless, the first prerequisite to use this paradigm is that the lead researcher must be Indigenous, or in the case of this study, Aboriginal and Torres Strait Islander. As the present study was led by a non-Indigenous woman, utilising a theoretical paradigm that necessitated

the researcher to have an Indigenous identity was not possible. Nevertheless, certain Indigenous scholars have identified that some non-Indigenous methodologies may be adopted as 'allies' to Indigenous research because they support Indigenous ways of being, knowing and doing.[19] PAR aligns with many of the values within an Indigenous paradigm. These values include shifts in power, valuing the knowledge of collaborators rather than researchers, working together with community members and authenticating voices of Indigenous peoples.[128] Commensurate to PAR is a transformative paradigm with a decolonising lens and agenda, which also supports the aims of an Indigenous paradigm, and Figure 8 illustrates the relationship between these constructs. The following section will

Figure 8 *An Indigenous Paradigm Underpinned by a Transformative Paradigm with a Decolonising Lens Supporting the PAR Methodology*



further explore the tenets of a transformative paradigm in the context of the Grinnin' Up Mums & Bubs study.

5.4 A Transformative Paradigm Embedded Within an Indigenous Paradigm

Traditional constructivist paradigms draw on the ontological belief that every person possesses a unique reality that is socially constructed.[146] However, transformative paradigms also go further to explore the invisible yet profound impact of power between the researcher and the participating community members.[147] Transformative ontological assumptions identify that realities are not viewed nor created neutrally, but through a social, cultural, racial, ethnic, political and economic context.[147] Within this study, a transformative paradigm serves to address the issues around social justice[147] and provides a platform where the roles of the non-Indigenous researchers, those traditionally in power, can be challenged. Although a transformative paradigm has a Western worldview, it possesses philosophical underpinnings that support an Indigenous paradigm and interests. Transformative research focuses on social justice, and with a decolonising lens it focuses on self-determination.[148] Further, it supports the framework's underpinning keystone of self-determination, partnership, and valuing of Indigenous knowledges. Transformative epistemology centres on the power dynamic between the 'knower' (the researcher) and the 'would-be-known' (community members).[147] It also shifts the focus of the research on building respectful and collaborative relationships with Aboriginal and Torres Strait Islander communities, and focuses on the needs of communities and working together with them to create change. To support an Indigenous paradigm for this study, it was necessary that the candidate developed a relationship with the Aboriginal health staff involved in the research, had respect for cultural differences, and had a consciousness of power differentials.[149] These aspects of a transformative paradigm, which aligned with the

PAR methodology developed, were necessary to ensure that the research would be conducted in ways that would value Indigenous knowledge.

Understanding the ontological and epistemological tenets of a transformative paradigm helped shape the methodological decisions for the Grinnin' Up Mums & Bubs study. Although a quantitative, qualitative or mixed-methods approach may be utilised flexibly within a transformative paradigm, it was essential that both the researcher and the participants defined the problem and the methods that should be undertaken. These principles also aligned with the use of PAR. Collaborating with the participants was essential for this study to recognise potential issues of power, discrimination, and oppression, and to ensure that complex cultural protocols would be observed. These decisions aligned with some of the theoretical principles that guide Indigenous methodologies. Such principles include that researchers need to honour Indigenous cultural and social customs, and privilege the voices of Indigenous peoples so that Indigenous worldviews, and ways of knowing and being are recognised.[150]

Transformative axiological assumptions, assumptions that relate to ethics and moral behaviour, explore three main areas: respect, beneficence and justice.[147] With an Indigenous research paradigm, there is also the need to consider relational accountability, respectful representation, reciprocal appropriation and rights and regulations to cultural protocols.[151, 152] Respectful representation was important to ensure that Aboriginal and Torres Strait Islander individuals were heard and that they would have rights over what knowledge would be shared. Reciprocal appropriation, which aims for both the participating individuals and the researcher to benefit from the research, was another important consideration. These considerations are important, considering the decolonising lens that this study employed.

At the core of a decolonising lens is the aim to challenge the control of Western views on knowledge creation so that Indigenous knowledges and experiences can be prioritised.[153] Māori scholar, Graham Smith, noted that Indigenous research needs to benefit Indigenous people in some way, shape or form,[141] which is consistent with the axiological assumptions of this research. In application to the Grinnin' Up Mums & Bubs study, the voices, knowledges, and experiences of Aboriginal and Torres Strait Islander peoples needed to inform the research agenda and the underpinning research methods. Moreover, it was important for the candidate to recognise the structural inequalities and systems that disempower Aboriginal and Torres Strait Islander Australians from informing potential solutions.[2]

5.5 Positionality and Maintaining a Cultural Lens

A key, anticipated challenge of the research was to maintain a cultural lens throughout the process as it was led by a non-Indigenous woman. As the research was embedded within an Indigenous paradigm, it was important to interrogate how the candidate's positionality shaped the ways knowledge would be created and interpreted. A critical reflection on the candidate's positionality could bring light to the strategies needed to ensure that Indigenous ways of knowing, being and doing were prioritised throughout the study. As part of the conceptual framework, a journal was kept throughout the candidature. The following section is an excerpt from the candidate's reflexive journal.

5.5.1 Excerpt from the Candidate's Journal

Geography is an important aspect of positionality. I identify as a female first-generation immigrant from the Philippines. I arrived here in the mid-1990s when I was still quite young. Having grown up in Australia I can only think, speak, and write in English. I have only ever lived in urban cities. Perhaps as with other immigrant families, there was a stark contrast between the culture of my parents and the mainstream Western culture. Yet as I

was growing up, my parents did not embrace mingling with other Filipino communities and encouraged assimilation into Australian culture.

Although I have considered myself as an 'outsider' at times as an immigrant, I realise the immense privilege I receive from living within the colonial structures embedded within Australian society. Having an Australian citizenship has meant that I can live and work in a society with relative political, social, and economic stability. Having received my primary school, high school, and university education in Australia, most of my education has been free – but also shaped with Western values or ideals.

When I consider this present study, I realise I have very little 'insider' relationship with the Aboriginal and Torres Strait Islander communities that I have started collaborating with. While I identify as a woman, I'm not a mother nor have I experienced pregnancy. Although I am from an ethnic minority, I do not share any of the experiences of the Aboriginal and Torres Strait Islander researchers and participants in this study. My immediate family (nor I) have never experienced any of the personal or collective trauma experienced by many Aboriginal and Torres Strait Islander communities because of present or past Australian policies. Today I have (and was brought up with) positive attitudes towards accessing government or health services, whereas some Aboriginal and Torres Strait Islander individuals may associate these services with fear, resistance, or contempt because of historical and social factors.

There is a certain philosophical dichotomy relating to positionality; that is, whether the researcher is the 'insider' or the 'outsider'. I acknowledge that being more of an outsider than an insider poses certain disadvantages and advantages to the research. Perhaps the greatest disadvantage is that of trust—I commenced the study without having developed relationships, nor do I understand the correct cultural protocols and complexities of the

Aboriginal and Torres Strait Islander communities I'm in contact with. On the other hand, being an outsider does mean that the Aboriginal and Torres Strait Islander persons involved in the research will probably not assume that I would have the same insider knowledge. Distancing myself from being the 'expert'; however, could be advantageous in fostering the meaningful involvement of Aboriginal and Torres Strait Islander peoples in the study.

The following section will identify and describe the strategies that were employed to address and mitigate some of the concerns raised by the candidate's positionality statement.

5.5.2 Strategies to Foster Involvement of Aboriginal and Torres Strait Islander Peoples

To ensure that the paradigm and the PAR conceptual framework are followed, specific strategies needed to be employed to ensure that a cultural lens is employed throughout the research process. Meaningful engagement of Aboriginal and Torres Strait Islander researchers in all aspects of the research, particularly as a non-Indigenous person leading the project, was essential. Such engagement was crucial to the conceptual framework, PAR methodology as well as the paradigm used in the study. As identified by the elements in the conceptual framework (Figure 6), Aboriginal and Torres Strait Islander researchers were critical to the conception of the research as well as introducing the research project to various Aboriginal and Torres Strait Islander stakeholders and communities; determining the study design; acquiring ethical approval; and all key decisions made. There also needed to be a cultural lens from Aboriginal and Torres Strait Islander researchers during all stages of data collection, including recruitment; data analysis; interpretation of the data analysis; and disseminating the findings in manuscripts, presentations, or other formats to ensure that the messages are appropriately communicated. In this study, Aboriginal management staff, Aboriginal and Torres Strait Islander health staff, Aboriginal research assistants and Aboriginal academics, who had a supervisory role, were closely involved in all phases of the research.

In addition to the involvement of Aboriginal and Torres Strait Islander researchers, an Aboriginal Action Group was formed to assist with key decision making throughout the research. The Aboriginal Action Group comprised of the Aboriginal and Torres Strait Islander researchers already involved in the research as well as other important stakeholders. The stakeholders included policy makers at a state level, Aboriginal and Torres Strait Islander mothers in the community, health management staff who were not of Aboriginal or Torres Strait Islander descent, and non-Indigenous researchers with experience in Aboriginal and Torres Strait Islander health.

The Aboriginal and Torres Strait Islander researchers included research assistants and the candidate's doctoral supervisors. The candidate and the entire supervisory team convened every six weeks to discuss her progress with the study. Her Aboriginal and Torres Strait Islander supervisors specifically provided cultural guidance during these meetings, and outside of these meetings she met with her supervisors to yarn about her experiences conducting Aboriginal and Torres Strait Islander research in a non-Indigenous academic environment. The candidate's non-Indigenous supervisors also provided academic and other discipline-specific guidance, in the areas of integrated oral health and antenatal care.

The Aboriginal research assistants who were employed at specific timepoints during the project also met with the candidate to discuss the qualitative data. Specifically, the research assistants co-analysed the data to ensure that it would be interpreted through a cultural lens, and were also invited to co-author publications. One of the Aboriginal research assistants also assisted with obtaining additional feedback on the various resources developed.

The health management staff played a key role in facilitating contact with the AHWs and FPWs at the beginning of the project. They also facilitated scheduling so that the AHWs

and FPWs could have the opportunity to be part of the study. The dental health management staff also liaised with the candidate to discuss improving processes so that access to culturally safe dental services could be improved.

The AHWs and FPWs, however, took on a greater role in determining the methods and potential study outcomes, and participated in the study. The AHWs and FPWs were also critical to gaining additional feedback on the oral health promotion resources from Aboriginal and Torres Strait Islander mothers. Aboriginal and Torres Strait Islander mothers also participated in formal data collection to inform knowledge on oral health needs as well as the development of an appropriate oral health model.

The policy makers who participated in the study discussed with the candidate in the initial phases about the availability of dental services, particularly access to appropriate dental services for Aboriginal and Torres Strait Islander women. The candidate also provided updates about the project and its outputs to policy makers.

5.5.3 Strategies to Ensure that Aboriginal and Torres Strait Islander Ways of Knowing are Upheld

Given that this research was led by a non-Indigenous researcher, several strategies were employed to ensure that Aboriginal and Torres Strait Islander ways of knowing were upheld throughout the research. The conceptual framework for this study provided guidance on the strategies that should be employed.

During conceptualisation of the study, involving researcher and research preparation, the candidate yarned with various Aboriginal and Torres Strait Islander peoples about the need and guidance for the project. The candidate yarned with researchers from a nationally-recognised Indigenous research centre, who had previously developed an early childhood oral health program for Aboriginal and Torres Strait Islander communities, who provided insight

and knowledge about appropriate ways of knowing and doing. The candidate also yarned with Aboriginal health management staff at two health services to discuss the initial need for the project within their communities, and various cultural safety training that the candidate needed to undertake. The management staff also introduced the candidate to the Aboriginal health staff, including AHWs, and FPWs, within their respective services. Yarning with the Aboriginal health staff elucidated the oral health needs among Aboriginal and Torres Strait Islander pregnant women within the communities, and ways of conducting research that would prioritise Aboriginal and Torres Strait Islander knowledges. These ways included how they would be involved in the research through decision-making, formal research participation and interpretation of the data; methods of research that involved yarning with Aboriginal and Torres Strait Islander people; and that the outcomes would specifically benefit Aboriginal and Torres Strait Islander peoples within the community. This process of yarning established the approach for the research to ensure that Indigenous ways of knowing would be upheld.

Another strategy that was employed was the inclusion of Aboriginal and Torres Strait Islander researchers through the process of data analysis. Even though the Aboriginal health staff yarned with the candidate about the findings from the qualitative phase, including Aboriginal and Torres Strait Islander researchers who were also immersed in the data was needed to ensure that there would be a cultural lens. Two different Aboriginal Research Assistants were employed to assist with the analysis for the focus groups and the interviews (Phase 1A and 1B). The Aboriginal Research Assistants independently coded and analysed the data from the candidate, and informed the constructed thematic frameworks. After analysis with the Aboriginal and Torres Strait Islander researchers, the Aboriginal health staff were also consulted in Phase 1A to inform the interpretation of the data. This additional

strategy ensured that the integrity of the Aboriginal and Torres Strait Islander knowledge shared would be maintained.

5.6 Summary

This chapter delineated the challenges with selecting an appropriate paradigm to support PAR among Aboriginal and Torres Strait Islander Australians, and how an Indigenous paradigm was to be adopted so that Aboriginal and Torres Strait Islander knowledge, experiences and voices were heard and realised. While the research followed elements of a transformative paradigm, at the core of the research was a decolonising agenda. As the candidate reflected on her positionality as a non-Indigenous researcher, strategies to foster the involvement of Aboriginal and Torres Strait Islander researchers as well as upholding Aboriginal and Torres Strait Islander knowledges were outlined.

Chapter 6: Methods

6.1 Overview

This chapter will describe and justify the use of an embedded mixed-methods design, provide details and the rationale for the different phases of the study, and discuss the ethical considerations.

6.2 Study Design

The overall aim of the Grinnin' Up Mums & Bubs study was to develop and pilot test an evidence-based and culturally appropriate model of care to promote oral health among Australian Aboriginal and Torres Strait Islander pregnant women by capacity building Aboriginal health staff. As alluded to in the previous chapter, studies that employ a transformative paradigm offer flexibility in the use of qualitative, quantitative or mixed-methods research. This study used an embedded mixed-methods design with a strong qualitative element. An embedded mixed-methods design comprises either a primarily qualitative or quantitative research design.[154] In this study, the primary qualitative design embedded some quantitative data collection and analysis alongside the primary research design.[154]

Qualitative approaches were used in the first phase (Phases 1A and 1B) of the current study to gather evidence on the aspects of a potential model of care that needed to be considered. The succeeding phase (Phase 2) involved a mixed-methods component to achieve the second part of the study aim; that is, to conduct a pilot evaluation of the model of care with Aboriginal health staff. Figure 9 demonstrates the embedding of quantitative methods within this qualitative study. Table 3 also provides an overview of the research activities in each of the study phases.

Figure 9 *Embedded Mixed-Methods Study; Capitalisation of "QUAL" Indicates the Qualitative Emphasis in This Study Compared to "quant" (Quantitative)*

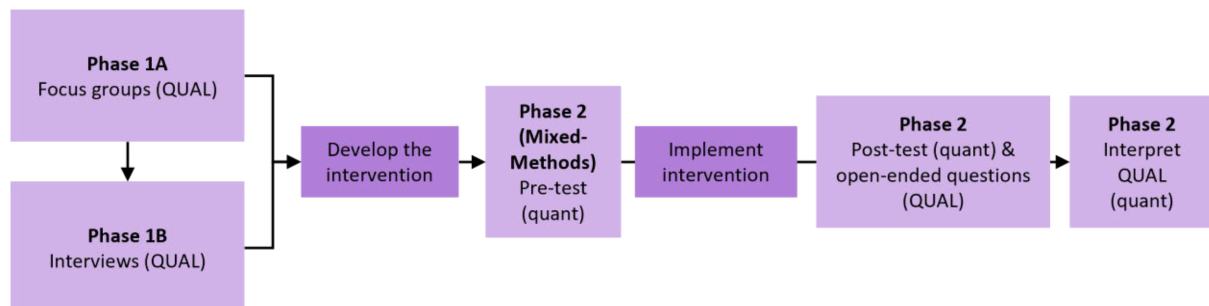


Table 3 *Summary of study phases*

Phase	Target Population	Study Locations	Research Activities	Timeline	Impact of COVID-19 on study phase
Phase 1A	Aboriginal health staff	Two health services	Qualitative focus groups (face-to-face)	March 2019 – June 2019	Nil impact (pre-COVID)
Phase 1B	Aboriginal and Torres Strait Islander pregnant women and mothers	Varied	Qualitative interviews (face-to-face and telephone)	August 2019 – November 2019	Nil impact (pre-COVID)
Phase 2	Aboriginal Health Workers	Southwest Sydney	Development of model of care Training delivered Pre-post testing	April 2021 – May 2021	• Drop out of second site • Delays in implementation of model of care • Delays in data collection

6.3 Rationale for the Embedded Mixed-methods Design

Combining both qualitative and quantitative approaches in this embedded mixed-methods study design allowed for the creation of knowledge to conceptualise and develop a potential model of care. Focusing on a qualitative approach initially generated a sufficient knowledge base to determine the oral health needs and experiences of both the Aboriginal

health staff and Aboriginal and Torres Strait Islander women during pregnancy. This was important to ensure that the model of care would be tailored to include components that would address needs and gaps. As a similar model of care has not been previously developed for Aboriginal and Torres Strait Islander pregnant women, a primarily qualitative approach would facilitate a more nuanced lens to inform the model of care. Piloting the model with Aboriginal health staff was interpreted through a primarily qualitative lens to align with the use of PAR methodology and an Indigenous paradigm, where Aboriginal and Torres Strait Islander knowledge and voices would be known and heard. The inclusion of the quantitative pre-post data provided supplementary information to support and provide additional insights into the qualitative knowledge shared by the Aboriginal health staff.

6.4 Phase 1

Phase 1 was divided into two qualitative components with the Aboriginal health staff (Phase 1A) and with Aboriginal and Torres Strait Islander women (Phase 1B). The overall aims of Phase 1 were to explore perspectives to gain insight into the development of a culturally appropriate model of care to promote oral health during pregnancy.

6.5 Phase 1A: Qualitative – Aboriginal Health Staff

6.5.1 Aims

Understand the experiences and perspectives of Aboriginal health staff towards oral health care for Aboriginal and Torres Strait Islander women during pregnancy. The findings also informed the development of a culturally safe oral health model of care for Aboriginal women during the antenatal period.

6.5.2 Methodology

Phase 1A of the study was underpinned by a qualitative methodology (PAR) that employed yarning as the main method. Yarning refers to a dialogue or conversation that

involves the exchange or passing on of Aboriginal and Torres Strait Islander knowledge that also prioritises Aboriginal ways of knowing, being and doing.[155] Yarning is a rigorous method of data collection among Aboriginal and Torres Strait Islander peoples.[155, 156] It is differentiated from traditional focus groups as Aboriginal and Torres Strait Islander ontology, epistemology and axiology are centralised, which reflects an Indigenous paradigm as well as the PAR methodology. With yarning, Aboriginal and Torres Strait Islander peoples are the custodians of knowledge.[155]

6.5.3 Maintaining a Cultural Lens

Several strategies were employed to ensure that a cultural lens could be maintained throughout this phase of the study. Prior to the onset of the study, the candidate began to build relationships with the Aboriginal health staff through social yarning.[155] Through yarning, the staff identified that oral health during pregnancy was an area that required additional attention. Furthermore, the Aboriginal health staff suggested ways in which they could contribute to the research during this phase; that is, through focus groups, discussion of the initial analysis, and in key decision making to inform the model of care.

As the candidate is a non-Indigenous Australian woman, Aboriginal researchers were also involved in the analysis and interpretation of the data. Aboriginal people who were also in managerial health service positions, assisted with decision making throughout the study (refer to Paper 3 for more detail).

6.5.4 Setting

This phase of the study was conducted in the Greater Western Sydney region of NSW, Australia. Specifically, two different antenatal services in Sydney that employed AHWs and FPWs were involved in this phase. These two services provided culturally safe,

outreach antenatal care services where the AHWs and FPWs partnered with nurses to provide both clinical care and cultural support.

6.5.5 Population and Recruitment

A purposive sampling technique was employed to recruit AHWs, FPWs and Aboriginal management staff who were employed at two antenatal services in the Greater Western Sydney region. All potential participants had experience with promoting antenatal health among clients in NSW. There were no exclusion criteria.

Although the candidate had met with the Aboriginal health staff during the conceptualisation of the study, champions at the sites liaised with the candidate and the Aboriginal health staff to ensure that appropriate cultural protocols were followed at the service by the candidate and research team. The champion assisted with negotiating an available time and date for the focus group with both the candidate (who facilitated the focus groups) and the staff and sent an invitation for participation to the health staff.

6.5.6 Data Collection

The focus groups were facilitated face-to-face through yarning.[155] The use of yarning facilitated a change in dynamic during the focus groups so that the external, non-Indigenous researchers learned from the Aboriginal health staff's knowledge. This knowledge included the staff's expertise, perspectives, beliefs, and attitudes. The perceptions of the Aboriginal health staff on the oral health needs and experiences of Aboriginal and Torres Strait Islander women during pregnancy were also explored to assist with triangulation of the data.

The candidate was the main facilitator for all focus groups. For one of the focus groups, another investigator (co-supervisor) was present. All focus groups were conducted in a private room at the community health care centre where the health staff were based. The focus groups were prefaced by the distribution of participant information sheets (Appendix 1)

and the participants were provided the opportunity to clarify and ask any questions about the study before providing informed consent (Appendix 2). The candidate verbally reiterated that the participants were in a safe, confidential space with no obligation to participate, nor were there consequences for non-participation. All participants completed a form to provide demographic information (Appendix 3). Consistent with a yarning methodology, a semi-structured approach was adopted for the focus groups to give the Aboriginal health staff the freedom to explore unanticipated topics, areas of importance and share insightful anecdotes and experiences. Five key areas guided the yarning:

- Previous experiences (struggles/successes) caring for Aboriginal and/or Torres Strait Islander pregnant women (tease out the nature of their relationship)
- Knowledge about antenatal oral health (problems faced, priorities, practices, trends from both theirs and clients' perspectives)
- Potential education, assessment, and referral (challenges and facilitators)
- Education and training (their needs/how they envision it)
- Other comments and questions

These key areas were derived from both a combination of gaps in the literature, identified through the study's literature reviews,[157, 158] and initial yarns with the Aboriginal health staff. The three focus groups were 52 to 88 minutes in length. All focus groups were audio recorded. The candidate wrote field notes after each focus group.

6.5.7 Data Analysis

All focus groups were professionally transcribed before analysis. An inductive thematic analysis that followed the framework outlined by Braun and Clarke [159] was employed. The analysis was supported by NVivo Version 11, a software designed to facilitate qualitative analysis (QSR International Pty Ltd). Although the candidate conducted the initial

checking, coding and categorisation of codes, the themes were further developed and checked for consensus with an Aboriginal Research Assistant and with a third investigator (another co-supervisor) with experience in qualitative research. The preliminary themes were shared, discussed, and finalised with the participants, who provided verbal feedback to the candidate. An inductive thematic analysis was selected, as it facilitates a flexible approach to analysis. Within the context of an Indigenous paradigm, thematic analysis allows for researchers to investigate certain areas in greater depth while also interpreting the data either explicitly or implicitly.[160] Taking this approach was important for a participatory action framework that focused on maintaining a cultural lens. The stories, language and perspectives that are shared by Aboriginal and Torres Strait Islander individuals may encompass meanings or experiences that are implicit to what is spoken. Thus, thematic analysis would allow Aboriginal and Torres Strait Islander researchers to attribute additional meaning to what was explicitly shared by participants based on personal cultural knowledge.

6.6 Phase 1B: Qualitative – Aboriginal Pregnant Women and Mothers

6.1 Aims

Investigate Australian Aboriginal women's experiences and perceptions of oral health during pregnancy to inform the development of a culturally safe antenatal oral health model of care. More specifically, this sub-phase aimed to explore whether oral health was an important consideration for Aboriginal and Torres Strait Islander women during pregnancy, whether oral health could be promoted by Aboriginal health staff, and strategies that would be appropriate to use in a new model of care.

6.2 Setting

This study took place in NSW, Australia. Most participants who were recruited resided in an urban area in the Greater Western Sydney region.

6.3 Population and Recruitment

Aboriginal and Torres Strait Islander women, who were pregnant, or had a child that was less than 12 months of age were recruited for the study. Although the initial design only involved Aboriginal and Torres Strait Islander women who were pregnant at the time of the interview, the Aboriginal health staff, who discussed the study design with the candidate, were concerned that many women would not be able to participate due to competing commitments during pregnancy. Women who were younger than 18 years of age were excluded, as were women who were prescribed bed rest by their health care provider. In some settings, a high-risk pregnancy may be considered if the woman also has a comorbidity such as hypertension, obesity or diabetes.[161] For this study, any woman who was specifically prescribed bed rest by their health care provider at the time of the interview were excluded, as the term 'high-risk' could potentially exclude a significant proportion of Aboriginal and Torres Strait Islander pregnant women.

Purposive and snowball sampling techniques were utilised to recruit participants. Several strategies were employed to recruit Aboriginal and Torres Strait Islander women due to the hard-to-reach nature of some of the participants who would be eligible for the study. Specifically, women were recruited through word-of-mouth, a flyer posted on the social media Facebook page of an Indigenous research centre (Appendix 4), and through antenatal health workers (midwives, AHWs and FPWs). All participants were provided an information sheet (Appendix 5), which was also verbally discussed with the candidate to check if any information needed to be clarified. Informed consent was obtained from all participants (Appendix 6). Recruitment occurred until a high level of data saturation was reached, where no new thoughts or ideas were shared by participants.[162]

6.4 Data Collection

All semi-structured interviews were conducted either face-to-face or over the phone at a time convenient to the participant. One-on-one interviews were selected as the method for data collection due to the potentially sensitive topic of oral health and experiences during pregnancy. As Aboriginal and Torres Strait Islander communities are often close, Aboriginal health staff were also concerned about maintaining confidentiality and openness if focus groups were conducted with Aboriginal and Torres Strait Islander women instead. Participants were, however, given the choice of bringing a support person of their choice to the interview. All interviews were conducted by the candidate, and were 21 to 77 minutes in length. The interviews were audio recorded, and the candidate also wrote memos for each interview. The following prompts were used for every interview:

- Background about self and family *(including how closely does the participant identify and relate with the Aboriginal and Torres Strait Islander community)*
- Experiences about your health/your baby's health during pregnancy
- Oral health during pregnancy *(knowledge, importance, past experiences, challenges)*
- Involvement of Aboriginal health staff (or other antenatal care provider) in your oral health care *(tease out relationship between woman and the health worker)*
- Other comments/questions

6.5 Data Analysis

All interviews were transcribed through a professional transcription service and checked by the candidate for accuracy. An inductive thematic analysis framework, described by Braun and Clarke [159], was employed to analyse the data. The candidate constructed the initial codes with the assistance of NVivo Version 12 (QSR International Pty Ltd). The candidate and an Aboriginal Research Assistant (who was different from the Research

Assistant involved in Phase 1A) independently developed the categories from the codes and wrote memos to inform the analysis. The independent analyses of the candidate and the Research Assistant were discussed until preliminary themes were constructed. These themes were reviewed by the supervisory team and discussed until a consensus was reached.

6.7 Strategies to Ensure Trustworthiness for Phases 1A and 1B

Strategies as outlined by Shenton [163] were employed initially, and throughout the research, to ensure trustworthiness of the qualitative data. To improve credibility, the candidate engaged in early consultation in 2017 with Aboriginal management staff across two health services in Greater Western Sydney to discuss whether oral health was a need among Aboriginal and Torres Strait Islander women living within the local communities, and to establish to what extent the AHWs and FPWs would be involved in the project to minimise the burden on their existing workloads.

Triangulation was also used through exploring perspectives of both Aboriginal health staff (from two different services) in focus groups and Aboriginal women (from both rural and urban areas) in interviews to inform the development of the model of care (as discussed in Paper 4, none of the women identified as Torres Strait Islander). Aboriginal researchers were also involved in the analysis and interpretation of the data. To facilitate honest responses from participants, the candidate emphasised before every interview and focus group, that the data collected would be de-identified and confidential. It was also emphasised that participants could choose to withdraw from the interview at any time.

Cited as one of the most important strategies for credibility by Guba and Lincoln [164], the focus group transcripts and analysis were checked by Aboriginal health staff at both services, who also discussed the interpretation with the candidate to ensure integrity of the analysis. Due to the commitments of the Australian Aboriginal women who participated in

the interviews, checks for data accuracy took place after each interview where the participant could request for any part of the interview to be removed or edited to ensure that the dialogue corresponded with the intended meaning. The candidate also took memos as reflexive commentary during and after each set of data collection to monitor and review thoughts and impressions throughout the analysis; this was used for both critical reflection and to assist with interpreting the data. Finally, throughout the research project, the candidate co-presented the data at academic conferences with Aboriginal health staff as well as at higher degree research student conferences, and for Aboriginal and Torres Strait Islander audiences for peer scrutiny.

Although triangulation is an approach to facilitate credibility, it also supports confirmability. Other approaches that were used included the identification of the candidate as a non-Indigenous woman in the publications, recording and checking of transcripts, the use of NVivo to assist with recording each stage of analysis and keeping an audit trail, and including de-identified quotes from the data to support the themes that were constructed in the analysis. While it may be argued that using strategies to increase credibility lends itself to increased dependability,[165] including detailed information about the methods was employed as an additional strategy to strengthen dependability, so that the study could be considered for other similar contexts. The details of the research were included in the methods section of each publication, particularly around the design, conceptualisation, setting, characteristics of participants, recruitment, data collection and analysis.

6.8 Phase 2

6.8.1 Aims

The aim of Phase 2 was to develop and pilot test the intervention, a culturally appropriate model of care with AHWs to promote oral health during pregnancy. The

objectives of this phase were to, firstly, develop an evidence-based, culturally appropriate oral health model of care for pregnant women, and secondly, to pilot test the model of care with the AHWs to identify the acceptability and satisfaction of the model of care, improvements in their oral health knowledge and confidence, and future recommendations.

6.8.2 Developing the Model of Care Following the Conceptual Framework

The development of the model of care followed the phases in the conceptual framework (Chapter 4, Figure 7), where the previous two phases of the study informed the third phase. To reiterate, in the conceptual framework, Phase 1 involved conducting literature reviews,[157, 158] and Phase 2 consisted of qualitative data collection.[166, 167] Phase 3 consisted of giving back to the Aboriginal and Torres Strait Islander communities and health staff who participated in the research by developing and piloting the oral health model of care. Phases 1 and 2 led to ideas to inform the model of care which included producing oral health promotion resources; creating a training program and workbook; and adapting and strengthening existing referral pathways to dental services. These components of the model of care were developed through collaboration with the Aboriginal health staff, obtaining community feedback particularly from Aboriginal and Torres Strait Islander women, and decision making with the Aboriginal Action Group. A more detailed description of the various components of the model of care has been included in Chapter 8. Images of the oral health promotion resources have been included in Appendix 7.

6.8.3 Pilot Testing the Model of Care

The components of the model of care were piloted using a pre-post-test, mixed-methods design. Using an embedded design, the pilot had a strong qualitative focus so that the AHWs could provide additional insights into improving the model of care. A quantitative component was included in the pre-post-test design to measure whether oral health knowledge and confidence changed after completion of the training.

6.8.4 Setting and Participants

Originally, the two sites that took part in the focus groups (Phase 1A) were going to participate in the pilot. However, due to public health restrictions during 2020-2021, the pilot was conducted at one service (further discussion about the impact of the Coronavirus-2019 (COVID-19) pandemic has been included in a later section). This service was a public health organisation where AHWs provided outreach antenatal care to Aboriginal and Torres Strait Islander pregnant women and mothers of young children, alongside child and family health nurses or midwives. This service was in the Greater Western Sydney area. The same site was involved in an earlier phase of the study (Phase 1A), where some of the staff participated in focus groups to inform the Grinnin' Up Mums & Bubs model of care. The criterion for recruitment was that the individual needed to be employed at the health service as an AHW; and there were no exclusion criteria. The AHWs were recruited through e-mail and participant information sheets (Appendix 8) were shared. The candidate provided verbal information about the study to the AHWs at a time that was convenient, before written consent was obtained (Appendix 9).

6.8.5 Pre-Post-Pilot Questionnaire Development

A pre-post pilot questionnaire was developed to collect quantitative and qualitative data about the components of the Grinnin' Up Mums & Bubs model (Appendix 10). The oral health knowledge and confidence questions were developed from the evidence published on oral health and pregnancy,[104, 168-170] the knowledge generated from the preceding phase, and from Australian dental health policies.[94, 97] The questionnaire was piloted with a group of Australian Aboriginals as well as non-Indigenous academics and researchers, and a biostatistician for content and face validity, and changes were made to improve the questionnaire.

The questionnaire was developed with three sections: Section 1 (oral health knowledge); Section 2 (confidence of the AHW); and Section 3 (feedback from AHWs about the model). In the pre-questionnaire, questions on demographic data were also asked. The knowledge questions were phrased so that respondents could select “True”, “False” or “Don’t know”. The confidence questions in Section 2 used a numerical Likert rating scale from one (“Not confident at all”) to five (“Completely confident”), where the respondent could indicate the level of confidence felt with each of the statements. For Section 3, a range of feedback questions were asked about the usefulness, relevance, and cultural appropriateness of the model’s components. Similar to Section 3, a numerical Likert scale from one (“Strongly disagree”) to five (“Strongly agree”) was used to indicate the individual’s agreement with the statement. At the end of Section 3, AHWs were asked three open-ended questions:

1. What did you like about the training/model of care?
2. What did you not like about the training/model of care?
3. Do you have any recommendations to improve the training/model of care?

6.8.6 Data Collection

Responses to the baseline questionnaire were collected at different times, convenient to the individual AHW, before the oral health training workshop was delivered. The post-training questionnaire was delivered immediately after the training was administered to ensure richness of the qualitative findings, avoid recall bias, and for pragmatic reasons, as the AHWs had limited availability. The AHWs were also given an opportunity to elaborate on their responses in the open-ended questionnaires after completing the written questionnaire. These verbal discussions of the three open-ended questions were between six and twenty minutes.

Three training workshops were delivered, as not all the AHWs were available at the same time. The workshops were face-to-face, and were delivered by Aboriginal researchers, a researcher with a dental background (principal supervisor) and the candidate. The training workshops were between one to two hours, were facilitated by a PowerPoint presentation, and were kept informal, as the AHWs were encouraged to ask questions and to share their thoughts throughout the workshop. The workshop included a basic theoretical component about oral health and pregnancy, and a practical component where it was discussed how the oral health promotion resources could be integrated into the AHWs' practice, as well as appropriate dental referral pathways that could be used.

6.8.7 Data Analysis

As identified in Figure 9, the analysis and interpretation of the data collected from the pilot used an embedded mixed-methods approach where quantitative analysis was used to complement and support the qualitative findings.

The qualitative data analysed included both the written and verbally recorded responses to the open-ended questions. The verbal qualitative data collected were transcribed through an external professional transcription service that specialised in confidential transcription for academic research. All qualitative data were collated, and then analysed following the conventional content analysis framework described by Hsieh and Shannon [171] A content analysis technique was utilised as the aim of the analysis was to identify and explore the words, meanings and concepts shared by the participants in relation to the intervention.[171] Content analysis was also used due to its flexibility in the data types; two different types of qualitative textual data were collected at this stage of the study. The candidate and a co-supervisor with expertise in qualitative research co-analysed the data.

Using the process described in conventional content analysis, the candidate read the transcripts for immersion, and after a few readings, highlighted words or phrases that encapsulated key concepts. Quotes that contained highlighted words and phrases were then exported to an Excel spreadsheet and were clustered based on the question the quote addressed. Quotes were coded, labelled, and categorised based on the ideas discussed. The clusters, codes, labels, and categorisations were then reviewed by the co-supervisor for refinement and accuracy. The candidate developed the coding structure by grouping similar codes to create more meaningful sub-categories. The sub-categories were then reviewed and further refined with the co-supervisor to create broader categories. Both the candidate and the co-supervisor developed the categories' definitions and labels; the candidate then identified specific examples (quotes) from each category to be included in the reporting of the data.

The quantitative data were analysed using descriptive statistics. Although more complex statistical analysis can produce more meaningful data, the small sample size limited the type of analysis that could be employed. The baseline and post-training oral health knowledge scores were calculated separately and compared for changes in average scores. The mean scores for the pre-post-test questionnaires of all participants were calculated based on the number of correct responses across the group. The oral health confidence was calculated based on the mean scores of the participants for each question in both the baseline and post-training questionnaires. The AHWs' agreement scores about the components of the model of care were calculated as an average out of 5.00, where a higher score indicated greater agreement, and more positive perceptions about the model of care. Overall agreement was observed if the average score for the question was greater than 4.00 (>80%). The data were analysed using SPSS Statistics for Windows, Version 25 (IBM Corp, Armonk, NY, USA).

6.9 Impact of the COVID-19 Pandemic on Study Methods

The COVID-19 pandemic, a global outbreak of a highly infectious coronavirus, began to spread rapidly from the end of 2019.[172] Governments around the world, including Australia, implemented a range of public health measures including lockdowns and social distancing to reduce the rate of infection.[172, 173] Due to socioeconomic inequities and cultural factors, Aboriginal and Torres Strait Islander peoples have an increased risk of mortality with COVID-19, compared to non-Indigenous Australians.[173, 174]

The NSW Aboriginal Health & Medical Research Council (AH&MRC) Human Research Ethics Committee rescinded approval for all face-to-face research relating to Aboriginal and Torres Strait Islander peoples. Fortunately, by the end of 2019, the focus groups and interviews had been completed, which were before the COVID-19 pandemic began to affect NSW. Based on discussion with the research team and the findings from the focus groups, however, the delivery of the training workshop with the AHWs needed to be face-to-face, since delivery through an online platform was considered inappropriate. The team agreed to wait until the AH&MRC Human Research Ethics Committee permitted face-to-face data collection, following public health and safety regulations.

The COVID-19 pandemic affected the study's methods in a few ways. To ensure cultural safety of all involved in the research, the project's timelines needed to be modified and extended. Unfortunately, there were some staff turn-over with the extended timeline, which affected the number of staff that could participate in the pilot phase of the project. Moreover, the impact of the pandemic on the health services meant that workloads tended to increase, decreasing the availability of the staff to actively participate in the project. One of the health services had also halted all home visits with clients and could not continue with the project once the restrictions lifted due to increased workloads on staff; an agreement was

made with the health service and the candidate to deliver and evaluate the workshop at a more convenient time for the staff.

6.10 Ethical Considerations

The study was approved by the NSW AH&MRC Human Research Ethics Committee (1438/18), and by the South Western Sydney Local Health District Human Research Ethics Committee (2019/ETH09963). Reciprocal approval was also granted by the Western Sydney University Human Research Ethics Committee (RH13086). The approvals from these committees have been included in Appendices 11-13. Due to the COVID-19 pandemic, amendments were made to the project to ensure that the project was both “COVID-safe” and culturally safe. As this research was specifically designed for and with Aboriginal and Torres Strait Islander peoples, additional ethical concerns needed to be considered.

The National Health & Medical Research Council, the main statutory authority for medical research in Australia, have produced guidelines that highlight the six core values in considering Aboriginal and Torres Strait Islander research: Respect; Responsibility; Reciprocity; Equity; Cultural Continuity; and Spirit and Integrity, which bind together all other values.[137] These values have been highlighted alongside other ethical considerations (informed consent, confidentiality, beneficence and self-determination). The following sections describe how these elements have been integrated into the research.

6.10.1 Self-determination

According to the UN General Assembly [132], self-determination is the right for peoples to pursue and determine their social, economic and cultural development. In this study, all participants were over 18 years of age, the legal age for an adult in Australia, and could make informed decisions about participating in the study. Although flyers were used to raise awareness about the study, the candidate discussed with participants what involvement would

include and how the data would be used. Self-determination was also strengthened through collaboration with the Aboriginal health staff about how the study would be conducted to reach the shared aims and goals of the project. Moreover, the women who participated in the interviews could choose when and where the interviews would take place and elect whether they wanted a support person present for the interview.

6.10.2 Confidentiality

At all stages of the research, it was emphasised that the individual had the right to have their information kept confidential. All names of the participating health staff and women were changed, and the names of specific places were omitted to ensure confidentiality. Pseudonyms were used prior to the analysis. It was discussed prior to the interviews, focus groups and pilot, that what was shared would remain confidential. The contact details of participants were used strictly to arrange for data collection/analysis, and in Phase 1B, they were used to provide gift vouchers. All consent forms were kept in a secure location at the Centre for Oral Health Outcomes & Research Translation (COHORT) at the Ingham Institute for Applied Medical Research, and all digitally identifiable information were accessible only by the candidate using a password.

6.10.3 Respect, Responsibility, and Informed Consent

Respect and Responsibility were both demonstrated through providing informed consent so that individuals would understand the information that would be shared before choosing to participate in the study. Responsibility was also demonstrated, as the study was based on a thorough review of the literature[157, 158] in response to the advice of Aboriginal and Torres Strait Islander researchers and staff to identify other potential models of care or programs in this area. All participants were informed, using both verbal and written information (Appendices 1,5, 8), about what involvement would entail, how the data collected would be used, and how the findings would result in a net benefit for Aboriginal

and Torres Strait Islander peoples. The participants also had a right to withdraw from the study at any time without impacting their relationship with their employer, the university, or with the provision of care at the health service. The candidate, who was the lead investigator on the ethics applications, also provided contact details should the participant want further information about the study.

6.10.4 Reciprocity and Beneficence

Strategies enabling Reciprocity need to facilitate equity of power and rights for Aboriginal and Torres Strait Islander peoples. Equity of power and rights is important to ensure that the research is credible and authentic. This study also demonstrated Reciprocity and Beneficence through identifying and addressing community needs, as articulated by Aboriginal and Torres Strait Islander peoples in the focus groups and interviews[166, 167] as well as discussion with health staff prior to the research, and focusing on capacity building to result in a net benefit for the involved stakeholders.

6.10.5 Equity and Cultural Continuity

Equity is reflected by prioritising and valuing the knowledge shared by Aboriginal and Torres Strait Islander peoples, whereas Cultural Continuity focuses on strengthening relationships with people and their environment. These values were reflected with the participatory approach of the study where Aboriginal health staff were actively involved in identifying the gaps and needs in the community, goals of the research, methods of data collection, and in key decision making. Furthermore, the Aboriginal Action Group, which also involved Aboriginal and Torres Strait Islander community women, researchers, and policy makers, was consulted for the development of the resources for the project. It was agreed that tangible outcomes, including the development of a range of resources, priority referral pathways to dental services, and training for the health staff, would benefit the community. The resources developed from the study would be jointly owned by the

collaborating health services and the university. Furthermore, the intellectual property rights of the art created by the Aboriginal graphic designer were purchased for the project; however, it was agreed that the graphic designer would be acknowledged. Finally, all Aboriginal women who participated in the interviews (Phase 1B) were compensated with an AUD $50 gift voucher for the time and knowledge that was invested into the research.

6.11 Summary

This chapter outlines the research design and methods that were used in the different phases of the study. It also outlined the various ethical considerations, particularly in relation to the important ethical values within Aboriginal and Torres Strait Islander research. The following chapters will present the study findings, which were published as peer-reviewed journal articles.

Chapter 7: Results (Phase 1A)

7.1 Overview

This chapter presents the results from Phase 1A of the study. Paper 3 presents the first of the qualitative findings, which were focus groups conducted with Aboriginal health staff. The perspectives obtained from this study informed the Grinnin' Up Mums & Bubs model of care and facilitated the use of PAR methodology in this study. The results are presented as a peer-reviewed article published in the International Journal for Equity in Health.

7.2 Citation: Paper 3

Kong AC, Sousa MS, Ramjan L, Dickson M, Goulding J, Gwynne K, Talbot F, Jones N, Srinivas R, George A. "Got to build that trust": the perspectives and experiences of Aboriginal health staff on maternal oral health. International Journal for Equity in Health. 2020;19(1):187. doi: 10.1186/s12939-020-01301-5

7.3 Aims: Paper 3

The aim of this study was to understand the experiences and perceptions of Aboriginal antenatal care providers, specifically AHWs, FPWs, and Aboriginal management staff, towards oral health care for women during pregnancy. This study was part of a larger program of research, informed by PAR, to develop a culturally safe model of care to meet the oral health needs of Aboriginal pregnant women and new mothers.

7.4 Conclusion: Paper 3

The Aboriginal health staff who participated in the focus groups provided insight into the oral health needs for clients during pregnancy, which included a significant focus on some of the external barriers and complexities affecting Aboriginal and Torres Strait Islander pregnant women, particularly with access to culturally safe and affordable dental services. AHWs and FPWs discussed how they could play an important role in oral health promotion for pregnant clients, particularly since their practice already focuses on the provision of

culturally safe care and developing trust and rapport. A caveat, however, was the lack of standardised oral health training and knowledge. A proposed model of care could include AHWs and FPWs engaging in oral health promotion with the adequate training, resources, and structures in place to facilitate referrals to culturally safe dental services.

International Journal for Equity in Health

RESEARCH Open Access

"Got to build that trust": the perspectives and experiences of Aboriginal health staff on maternal oral health

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Abstract

Background: In Australia, models of care have been developed to train antenatal care providers to promote oral health among pregnant women. However, these models are underpinned by Western values of maternity care that do not consider the cultural needs of Aboriginal and Torres Strait Islander women. This study aimed to explore the perceptions and experiences of Aboriginal health staff towards oral health care during pregnancy. It is part of a larger program of research to develop a new, culturally safe model of oral health care for Aboriginal women during pregnancy.

Methods: A descriptive qualitative methodology informed the study. Focus groups were convened to yarn with Aboriginal Health Workers, Family Partnership Workers and Aboriginal management staff at two antenatal health services in Sydney, Australia.

Results: A total of 14 people participated in the focus groups. There were four themes that were constructed. These focused on Aboriginal Health Workers and Family Partnership Workers identifying their role in promoting maternal oral health, where adequate training is provided and where trust has been developed with clients. Yet, because the Aboriginal health staff work in a system fundamentally driven by the legacy of colonisation, it has significantly contributed to the systemic barriers Aboriginal pregnant women continue to face in accessing health services, including dental care. The participants recommended that a priority dental referral pathway, that supported continuity of care, could provide increased accessibility to dental care.

Conclusions: The Aboriginal health staff identified the potential role of Aboriginal Health Workers and Family Partnership Workers promoting oral health among Aboriginal pregnant women. To develop an effective oral health model of care among Aboriginal women during pregnancy, there is the need for training of Aboriginal Health Workers and Family Partnership Workers in oral health. Including Aboriginal staff at every stage of a dental referral pathway could reduce the fear of accessing mainstream health institutions and also promote continuity of care. Although broader oral health policies still need to be changed, this model could mitigate some of the barriers between Aboriginal women and both dental care providers and healthcare systems.

Keywords: Aboriginal, Dental, Pregnancy, Qualitative, Yarning, Model of care

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Background

Oral health is important during pregnancy. An estimated 50–74% of women have periodontitis (gum disease) during pregnancy [1, 2], which is associated with an increased risk of pre-eclampsia [3], pre-term birth and low birth weight [4]. A mother's oral health and dental practices are also associated with the child developing dental decay across the lifespan [5]. Pain or functional limitations resulting from oral health problems can also have a considerable impact on the mother's quality of life during pregnancy and daily activities of children like eating and sleeping [6, 7]. Moreover, untreated oral health problems can be extremely costly [8].

The impact of poor oral health is exacerbated in socially disadvantaged families particularly those from culturally and linguistically diverse communities, as well as Indigenous communities (Additional file 1). In Australia, early childhood decay affects 40% of all children and the prevalence is much higher among the Aboriginal and Torres Strait Islander communities (hereafter referred to as Aboriginal, Additional file 1) [9]. Further, improving the maternal and infant oral health outcomes of Aboriginal communities continue to be a focus of the Australian government's national strategy to close the gap [10–12]. However, accessing health services can be both traumatic and stressful for some Aboriginal Australian women during pregnancy [13]. These feelings may arise because of the longstanding impact of colonisation (Additional file 1), leading to the loss of land, culture and language [14, 15]. Many Aboriginal Australians experience regular and ongoing personal and systemic racism [12, 16]. These social determinants have an association with wellbeing and self-efficacy [17], which is an individual's confidence in their ability to enact a desired behaviour [18]. Among Aboriginal mothers, having a high level of self-efficacy is an important factor in engaging in oral health behaviours such as accessing the dentist [19, 20]. With a collective history of oppression and dispossession, sense of self-efficacy among Aboriginal people may be readily depleted with negative experiences of attempted behavioural change [18].

Another determinant impacting dental behaviours of Indigenous women are the health policies that influence access to affordable dental care [21]. In Australia, 67% of health care is publicly-funded through the universal health care insurance scheme, Medicare [22]. The Medicare Medical Benefits Schedule provides support for a range of health care-related expenses [22]. Medicare-funded dental care, however, is more restricted to certain populations and is guided by the state or territory's health department [23]. In New South Wales (NSW), for example, adult residents need to be listed on a government-issued concession card to access the public dental service. Although dental services are also provided specifically for Aboriginal people through some Aboriginal community-controlled health services (ACCHSs) in NSW, the eligibility criteria may vary between ACCHSs [24].

Further, despite oral health recommendations for women during pregnancy [25, 26], oral health tends to be neglected by many antenatal care providers such as general practitioners (GPs), obstetricians/gynaecologists and midwives [27]. A model of care that includes training for midwives has been successfully developed and implemented in Australia to promote oral care for women during pregnancy [28]. While this model is effective in improving the competency of midwives to promote oral health as well as the oral health outcomes of expectant mothers [28–30], it was developed for health care services that uphold Western values of care. Consequently, the approach of current antenatal oral health models of care may not be culturally safe for many Aboriginal women.

Successful maternity care models among Aboriginal Australian women have included antenatal care providers who identify as Aboriginal, are connected to the Aboriginal community, and can provide culturally safe care with an Indigenous worldview [31]. These maternity care models may involve a partnership or team comprising of midwives, Child and Family Health Nurses, Aboriginal 'senior women', Aboriginal Health Workers (AHWs), Aboriginal Maternal and Infant Care workers or Family Partnership Workers (FPWs) [31–33]. Thus, to meet the cultural needs of Aboriginal communities, existing oral health programs for antenatal care providers need to be adapted for services that already provide culturally safe care to Aboriginal clients.

Aboriginal antenatal care providers, such as AHWs, have the potential to promote oral health care during pregnancy [34]. Within Australia, AHWs already promote oral health among other populations including children [34]. The aim of this study, therefore, was to understand the experiences and perceptions of Aboriginal antenatal care providers, specifically AHWs and FPWs, and Aboriginal management staff, towards oral health care for women during pregnancy. This study is part of a larger program of research, informed by a participatory action research (PAR) approach, to develop a culturally safe model of care to meet the oral health needs of Aboriginal pregnant women and new mothers.

Methods

Methodology

This study was underpinned by a qualitative descriptive methodology that employed yarning as a method [35–37]. Yarning involves conversing to share stories and exchange Aboriginal knowledge in a way that prioritises Aboriginal ways of knowing, being and doing [35–37]. It focuses on establishing and building respect, reciprocity and trust [37], and is a credible and rigorous method of research [37, 38].

Conceptualisation of study

Prior to the study, the lead author (AK) yarned with the Aboriginal health staff, who identified that antenatal oral health was identified as an area of importance. The Aboriginal staff also identified the desired outcomes for the study (that is, a culturally safe model of care) and described how they wanted to be involved in the study (through a focus group and periodic meetings for brainstorming and key decision making with various aspects of the model of care). To inform the model of care, the Aboriginal staff specified that yarning in focus groups with Aboriginal health staff was the most appropriate method of data collection, followed by interviews with Aboriginal pregnant women. These yarns informed the topic areas that could be explored during focus groups. The findings from the interviews with the Aboriginal pregnant women will be published elsewhere.

Ensuring a cultural lens

The initial yarns were important to cultivate trust between the Aboriginal staff and the lead author (AK), who identifies as a non-Indigenous Australian woman and convened the focus groups. In addition to the AHWs and FPWs, the study team included non-Indigenous (LR, MSS, AG, KG) and Aboriginal researchers (MD, JG, FT) who were involved in the analysis and interpretation of the findings. Both Aboriginal (NJ, BR) and non-Indigenous people (RS) with experience in delivering health services, assisted with decision making throughout the study.

Ethical considerations

Ethical approval for this study was granted from the South Western Sydney Local Health District (2019/ETH09963) and the Aboriginal Health & Medical Research Council (1438/18). Reciprocal approval was also granted from Western Sydney University (RH13086).

Context

This study was conducted in the Greater Western Sydney region in NSW, Australia. The study included staff from two antenatal health service programs designed for Aboriginal pregnant women and new mothers. These programs have an outreach model which involve AHWs or FPWs alongside nurses visiting clients to provide clinical antenatal support.

Sampling

Purposive sampling was used to recruit management staff and AHWs and FPWs involved in two different antenatal outreach programs. There were no exclusion criteria.

Data collection

The focus groups were conducted through yarning. Yarning involves a relaxed conversation and discussion where external researchers learn from Aboriginal peoples about their lived experiences, stories, thoughts and feelings [37]. It is different from traditional focus groups as Aboriginal peoples are the custodians of knowledge. Since yarning is part of Aboriginal and Torres Strait Islander ontology, epistemology and axiology [38], it creates a safe space for Aboriginal peoples to exchange knowledge [38]. Although in this study, non-Indigenous researchers convened 'focus group' discussions (the term 'focus group' will be used for consistency), they became yarning circles where the Aboriginal health staff exchanged knowledge about their own perspectives and personal views of Aboriginal women's experiences through shared stories in an Aboriginal way. This exchange, using yarning, changed the dynamic of the focus group so that the non-Indigenous researchers would learn from the Aboriginal health staff [38]. Including the perspectives of the Aboriginal health staff on the experiences of Aboriginal women was intentional to compare and triangulate the findings with the perceptions of Aboriginal women during pregnancy. A semi-structured approach to the focus groups was adopted, using five key issues to guide the focus group yarning:

- Previous experiences (struggles/successes) caring for Aboriginal and/or Torres Strait Islander pregnant women (tease out the nature of their relationship)
- Knowledge about antenatal oral health (problems faced, priorities, practices, trends from both theirs and clients' perspectives)
- Potential education, assessment and referral (challenges and facilitators)
- Education and training (their needs/how they envision it)
- Other comments/questions

Since responses to the key issues prompted spontaneous questions or discussion, the focus group structure was flexible. Yarning provided the Aboriginal staff the freedom to linger on certain areas, to explore unanticipated topics and the opportunity for priorities to be identified by the Aboriginal staff, rather than by the non-Indigenous researchers, ensuring that all views were canvassed and respected. This approach facilitated a dynamic exchange where Aboriginal knowledge could be taught and shared by the Aboriginal staff to the non-Indigenous researchers, building trust and reciprocity.

A total of three focus groups were conducted in private rooms at the community health centres where the Aboriginal staff were based. Prior to providing consent, AK reiterated verbally (supported by the participant information sheet) that the participants were in a safe, confidential space. The staff were not obliged to participate, nor were there consequences for non-participation, and they could withdraw consent at any time.

Two focus groups were conducted at one service to allow all staff to attend. A third focus group with the FPWs was conducted at the other service. The first focus group was convened by two of the study authors (AK and LR), where LR (a qualitative researcher) also wrote field notes. The subsequent two focus groups were facilitated only by AK, who wrote field notes after each focus group. All focus groups were audio recorded. The recordings were transcribed by a professional service and checked for accuracy by AK.

Participant demographics

Fourteen people participated in the three focus groups, including 7 AHWs, 2 Aboriginal management staff (who were not AHWs), and 5 FPWs. The FPWs' position descriptions were similar to AHWs, in that they raised cultural awareness within their teams to ensure culturally safe service delivery but did not necessarily require the same qualification. All participants were female, with an age range of 22 to 50 years. The highest educational qualification attained by staff included Year 12 ($n = 1$), vocational education ($n = 8$) or a university qualification ($n = 3$). Three staff, who already had vocational education, were also working towards a university qualification. Two people chose not to disclose this information. Years of experience working as an AHW ranged from three to 10 years, whereas the FPWs' years of experience were between 2 weeks to 8 years.

Analysis and interpretation

An inductive thematic analysis [39] was employed. All participants were assigned pseudonyms to ensure confidentiality. AK read and re-read the transcripts, listened to the audio recordings, read accompanying field notes and wrote additional memos to ensure adequate immersion in the data. AK initially coded the transcripts inductively using NVivo software. The initial codes were generated verbatim or in summary about an issue relating to the research aim. AK clustered similar codes together, generating initial categories. AK revisited these categories a second and third time for further understanding, and then combined the categories into themes across all focus groups. These themes were reviewed by another non-Indigenous researcher with experience in qualitative research (MSS) and by an Aboriginal researcher (FT). After agreement between AK, MSS and FT, AK convened with the AHWs and FPWs separately to yarn about the themes. This allowed for participants to check, engage and further contribute to the interpretation of the data, and ensure rigour [40]. All participants were invited for a follow-up discussion about the analysis, however only half of the participants ($n = 7$) were available due to unforeseen changes with client scheduling. This discussion refined the concepts underlying each theme and the language used to define the themes.

Results

Four main themes emerged from the focus groups (Table 1) relating to the Aboriginal staff's perspectives and experiences of maternal oral health care. All findings around the scope and future design of an antenatal oral health program will be published elsewhere.

Theme 1: more oral health knowledge and training to meet the local community's needs

The Aboriginal health staff recognised the importance of oral health during pregnancy and agreed that they could provide oral health education to pregnant Aboriginal women and mothers as part of their role. The participants discussed appropriate Aboriginal ways of doing in health services and highlighted the need for training in antenatal oral health.

Understanding Aboriginal ways of doing health service provision

Participants identified that any oral health training should be integrated into an existing antenatal program. Two of the staff identified a potential role for Elders (see glossary, Additional file 1) to pass on knowledge about healthy oral health practices.

> *I think you could build it into the [antenatal] program, though.* (Sharon, management staff)

Table 1 Focus group themes and sub-themes

Theme	*Sub-Theme*
More oral health knowledge and training to meet the local community's needs	• Understanding Aboriginal ways of doing health service provision
	• Current oral health training, knowledge and practices
Trust builds empowered relationships	• Building trust
	• Supporting women to make choices
Colonisation and intergenerational trauma: systemic barriers	• External barriers to accessing dental services
	• Feelings of 'shame': fear, anxiety and judgement
Systems that provide continuity of care	• Working in two worlds
	• Need for a priority dental referral pathway

I think, um, culturally we always go to our Elders for guidance so I think for the Elders to, um, have an opportunity to filter down ideas, guidance, support - that's an appropriate way for us. So I guess keeping in with that, um, you know, speak…and having that yarn and consultation with them. (Louise, AHW)

If we say something, then their grandma says something, they're not going to go say what we say – they're going to listen to their [Elders] (Teigan, FPW)

Current oral health training, knowledge and practices

One FPW had acquired oral health knowledge through formal training. All other participants across both services identified the need for a formal oral health training program.

I think I've just learnt it [oral health] over the training that I've done, like Certificate III and IV in Aboriginal and Torres Strait Islander Primary Health Care…then over my lifetime…I know I've got a thing about teeth. (Melissa, FPW)

Yeah, I think informal as well. I mean, we did do little in-services. We do do in-services on dental, so it could be some formal as well…I would be up for it [formal training] (Emily, AHW)

Across both services, the AHWs and FPWs already had some knowledge of the effect of pregnancy on a woman's oral health and vice-versa and understood the importance of a healthy diet for the mother's and baby's teeth. Several participants already encouraged women to see the dentist. The FPWs also handed out dental products to families.

So I know that during pregnancy, women's oral health can be exasperated from pregnancy. You know, that can cause wobbly teeth, it can cause decay to happen quicker, so it exasperates all of the symptoms, so I do know that. Um, it can cause headaches. It can cause other health concerns. It can stop them eating. It can give them anxiety. All kinds of different things (Emily, AHW)

If the client hasn't seen a dentist in a while, we usually ask them when was their last dental check-up. (Melissa, FPW)

So when we're talking about any good foods, we talk about the type of food you do that are better for your teeth rather than the sugary ones and the soft drinks and all that…About if you're having a lot of soft drinks which are high caffeine and high sugar that's going through to bub. (Louise, AHW)

I know with some of our clients, that we've gone out and some of the content we've - it's touched on the oral health, we've given, like in the gift packs, we've given out the toothpaste and toothbrush. (Melissa, FPW)

Theme 2: trust builds empowered relationships

The AHWs and FPWs from all the focus groups identified that promotion of oral health care needed to be provided in the context of relationships where trust was established with their clients. Building trust would ensure that they could give culturally safe support to Aboriginal pregnant women and mothers during the antenatal period.

Building trust

Trust was discussed as an imperative to understand their clients' needs and priorities. Building trust required time, empathy and sharing personal experiences (yarning).

Trust. Got to build that trust. (Melissa, FPW)

It's totally up to them and what they want. We tend to find that if we just sit there and have a yarn with them rather than push them. We find a lot of services do try and push, you known like, to tell the girls what to do. We don't do that: and we find we get better outcomes when we don't do that. (Karina, FPW)

But it's also too with that rapport building is that those yarns that you're having with your clients aren't about this is what you're doing, it's about you giving them your experience as well. So, you know, it's like, I've done this too. (Tess, AHW)

Reflecting on the importance of trust, both groups found that Aboriginal women tended to be more receptive to contact from AHWs or FPWs compared to nurses.

Often, at times, when they're in crisis and they don't answer the phone calls to the nurses, all it takes is one phone call from us and then we're back on board with them…when we contact them they're usually pretty honest with us about what's going on with them. (Sarah, AHW)

We basically just support the nurses. Already questions that the client might have. Sometimes they …direct the questions at us rather than the nurse. We just bounce off one and another and just support, you know, what we're delivering (Karina, FPW)

Supporting women to make choices

Following the discussion about the importance of building trust, the AHWs spoke about offering choices and

providing support by ensuring that the clients' needs were addressed. Regardless of whether this support was psychosocial, practical or both, the staff spoke about how this approach addressed some of the barriers that affected women's access to services.

> *Yes, and I actually just tend to ask, do you have somebody you can go with or do you feel okay doing this, um, or are you all right to make the call? Or if you haven't got credit, do you need to use my work phone or do you want to wait until you've got credit? So always giving options or if they've got ideas, well what do you think? So they'll let us know if they can't do that.* (Louise, AHW)

> *it depends on where the mum is at, I guess. I'll say it that way… Yeah, their ability to access, whether they're comfortable calling, because I'll call for some clients… We do provide transport if we need to as well.* (Emily, AHW)

When asked a question about the nature of the relationships the AHWs and FPWs had with the clients, some of the participants described themselves as being the connectors and interpreters for many clients.

> *I guess we're that connector, we're the connecter with a system that is different traditionally to what some of our systems would be or would look like. So we help break down the barriers of, um, an institution which has historically been, um, one that's had a negative attachment to it from past policies and history.* (Louise, AHW)

> *So it's kind of like - I think of us as…friendly – not a friend. Um, we look after their cultural stuff, you know, to help support them with culture? Um, we're the link between mainstream and Aboriginal people and Aboriginal culture stuff. We're kind of like interpreters as well? Because a lot of clinical stuff is a lot of jargon, so we, um, will explain it in a different way. We advocate – [emphasised] a lot.* (Emily, AHW)

Theme 3: colonisation & intergenerational trauma: systemic barriers

The long-term effects of colonisation and intergenerational trauma (Additional file 1), which affected clients' desire and ability to engage with services and institutions, were discussed in all focus groups. The Aboriginal staff spoke about the barriers for clients to access dental services. These barriers include cost of dental treatment, transport, dentists refusing to treat pregnant women, long-waiting time for an appointment, ineligibility to access ACCHS (Aboriginal community controlled health service) dental services, and systemic racism. The participants also identified that 'shame' (see glossary, Additional file 1) which accompanied feelings of fear, anxiety and being judged during a dental appointment, were factors that could affect an Aboriginal woman's desire to visit the dentist.

External barriers to accessing dental services

The AHWs and FPWs estimated how many of their clients (out of 10) would have dental problems during pregnancy. One participant said *"I've had two"* (Melissa, FPW), whereas others agreed that the number was closer to *"six to eight"* (Rachel, AHW) out of 10. Two participants agreed that only *"one to two"* (Melody, AHW) actually end up attending a dental appointment.

Cost, transport, and dentists who refused to treat pregnant women were cited by AHWs as some reasons for poor uptake of dental services.

> *They're thinking they have to go private and they don't have money.* (Sarah, AHW)

> *It's quite hard - especially if you don't drive and you have to catch public transport.* (Tess, AHW)

> *When I was pregnant with my last one, my tooth was actually bad up the back, and I went to the dentist and they refused to touch it because I was pregnant* (Rachel, AHW)

Some FPW staff also shared personal experiences or knowledge of the long waiting lists to access public and ACCHS dental services.

> *I went privately. I was like I need to get this out. It was killing me. I've had a wait list over at [ACCHS dental service], because I went to [ACCHS dental service] …but then the wait list to get my tooth removed was like a year?* (Ellie, FPW)

> *If you don't want to pay, like the waiting list for the one at [public dental service], for example. [exasperated sigh]* (Teigan, FPW)

The participants spoke about the need for a Health Care Card (concession card) to access public dental services; however, not all Aboriginal women qualified for this card if they were on a higher income. Furthermore, for Aboriginal women who were on a higher income, money was prioritised elsewhere.

> *Because I earn over the threshold, you don't get the free dental.* (Emily, AHW)

the Health Care card is the biggest issue. If they're still working while they're antenatal - they can't go and access [the public dental service] because they're still getting paid…They just can't financially afford to go to a dentist, but then on a higher income - because of choices of buying a home which is what we want to do… (Louise, AHW)

One person spoke about how negative experiences with government institutions created fear and became a deterrent for families to access government services. This staff member explained that even if these experiences were with one institution, the fear created a spill-over effect to any government institution.

That [institutions] goes hand in hand. [with racism] (Sally, AHW)

There are so many complexities sometimes that it's really difficult for families to engage with Centrelink to chase that. They might have previous debt. They might have a child that's come, that's left their care, and they're backwards and forwards and it's all too hard to go into Centrelink and negotiate in that space. So that whole fear of institutional contact is...So it's the fear of going in and having to deal with that entity, that institution, that's why Aboriginal families prefer that outreach contact.
(Jennifer, management staff)

Five participants explained that since ACCHSs provide free dental services for Aboriginal Australians, some non-Aboriginal people identified as being Aboriginal to access these services.

Dental's one of them. That's why they're [people who didn't identify previously as Aboriginal] *identifying, so they can get free access to it.* (Karina, FPW)

To address this, some ACCHS require 'confirmation papers' (Confirmation of Aboriginality) (see glossary, Additional file 1). Participants identified confirmation papers as a barrier for many clients, especially if the client was disconnected with their family because of policies leading to the Stolen Generations.

That's why it's harder to get the confirmation now, because people were just going and using names and getting their confirmation, where now you need to go to these meetings and it is harder… But then it's harder for people that are from Stolen Generations and don't have - and are disconnected with their family. It's just so - it's just all a big mess.
(Ellie, FPW)

The participants described the process of acquiring Confirmation of Aboriginality to be a long process.

That is pretty much - there's nearly a 12-month waiting list. So you fill in your application form, hand that in, then … once it's your turn they'll send you a letter and say this is the day and time that you need to present in front of the board – um, the board will ask you a couple of questions, and then it goes from there. So whether they accept it or not… More information, exactly. Come back or go back to where your family is known. (Melody, AHW)

Feelings of 'shame': fear, anxiety and judgement

The Aboriginal staff extensively discussed the shame, anxiety and fear associated with oral health and accessing dental services within the community. This anxiety and fear resulted from personal experiences or stories heard from within the community.

My dad's tooth just fell out…like the whole thing. He put it in the bin. I said, why did you do that? [Unclear]. I said, why didn't you take it to the dentist, and they can put it back in? He's like, nup. My nan yells at him every day, like rips him up. She says, you can't get jobs with teeth like that you need to go and fix your teeth. (Ellie, FPW)

There's also just dental in general, the horror stories…and shame (Rachel, AHW)

Sometimes it's the elders, they instil the fear, I've got to say, because my grandmother wouldn't go into hospital. Never went to a hospital. Some of my immediate relatives could be in there dying, she won't go to a hospital. She wouldn't go and see a doctor. She wouldn't go to a dentist. God, no, she never went to a dentist. Even though my nan had false teeth, she never went to a dentist in her life. (Jennifer, management staff)

The Aboriginal staff also discussed that feelings of shame arose from being embarrassed or from the fear of being judged.

Some people that we spoke to did this. [covers mouth with hand] Covered their mouth when they were talking to us. (Jennifer, management staff)

But also, I wouldn't initiate this story about how my parents didn't give me a toothbrush or do that, because I wouldn't want people to judge my parents. I'm sharing because it's safe. (Sharon, management staff)

> *I've got false teeth. Mine are through domestic violence. You know I mean? You've got to be careful on 'em lines too. Like, I don't mind talking about it. I'm strong enough to talk about it. But there's some that don't - you know what I mean, admit to that.* (Karina, FPW)

The participants discussed the effect of past policies of assimilation that allowed for the removal of children, enforced English as the only language that could be spoken, and policed cultural practices and activities. Some participants mentioned that as a result, knowledge, language and culture were not passed down to younger generations, including the passing down of traditional dietary and dental health knowledge and practices.

> *Back in the day you weren't allowed to [talk to anyone]… Doesn't matter if you were Stolen or not. Yeah, you just weren't allowed to. It was part of the white law at the moment. You know what I mean?* (Karina, FPW)

> *There's certain stuff, yeah, that they chew on and stuff like that, but no one's ever really passed that down.* (Karina, FPW)

> *Just living on bush tucker and nothing out there to hurt your teeth.* (Melody, AHW)

> *Yeah, and this is how it went off-track and the introduction of a Western diet, and when you think about why people choose the bottle over the breast and, you know, what they put in, it's because of what's going on…and you need to capture that from Aboriginal people. Um, some of that you can see how some people do know here, and how it's okay to regain that knowledge, because the same way why other knowledge hasn't been passed down, this is, you know, the same reason. So that, I think, is really important.* (Sharon, management staff)

Theme 4: systems that provide continuity of care

Working in two worlds

The participants discussed how they found themselves balancing their professional roles while also maintaining their cultural responsibilities within the community. The Aboriginal staff spoke about having a role in both 'worlds', suggesting that the services' policies were not always culturally safe.

> *Like, um, we obviously work under policies and guidelines, um - we're always competing with - what is culturally safe and appropriate versus policies that we've got [to] work under. So we're always adapting to make it work in regards to what we're allowed and what we know within ourselves as Aboriginal people what is actually appropriate to do within the homes.* (Louise, AHW)

One AHW shared an example where the existing workplace policies meant that Aboriginal clients had no option to access culturally safe and affordable dental services:

> *Well, I have a client that's just relocated from Melbourne. She's Aboriginal, no confirmation papers, she's not on the pension card, Health Care card, and her teeth are pretty much not there. What access does she have? Any kind of money that she has - she's got five - six children now. Very young mum, 23.… It's a brick wall. That's just an example.* (Sally, AHW)

Need for a priority dental referral pathway

All focus groups stressed the need for priority dental referral pathways that would provide free dental check-ups for all Aboriginal pregnant women and for women who were pregnant with an Aboriginal child. This was considered an important preventative initiative for the community.

> *…in an ideal scenario we can get them in and get them streamlined to have that check-up then as a preventative measure for when, as you just said, pregnancy and everything.* (Sarah, AHW)

> *Maybe that could be something, an escalated pathway so people in the program can make sure that within that - we get them checked within a...* (Sharon, management staff)*…Certain timeframe, like a KPI [key performance indicator]* (Jennifer, management staff)

> *But if we offered it as something that was offered to everyone across the board, it wouldn't be so confronting… You know, so if it was something that was offered to everyone [all pregnant women with Aboriginal babies]* (Sally, AHW)

Some participants suggested that there should be an initial dental appointment available to clients to raise awareness about existing oral health problems and subsequently discuss their potential risk.

> *Because then you go to a dentist and you find out. Because I wouldn't go unless I had an issue; then I would go* (Ellie, FPW)

So I don't know how that would fit but in my ideal world once she's pregnant I think she should be able to receive some treatment, whether that be an examination and fillings or what not, what they can do during the pregnancy
(Sharon, management staff)

One management staff recommended that all mothers with Aboriginal babies needed pathways to a range of public and private services, including ACCHSs.

So I think if you attach the model to your program, that could have several pathways. One into the AMS [Aboriginal medical service], because we do outreach there and we do different pathways and, you know, there's no wait for any Aboriginal child, so why can't we have that for our unborn child and mothers? And then you've got the voucher system, where if you're needing services [the AMS] can't provide, you can get a voucher…into private dental. (Sharon, management staff)

It was important that non-Aboriginal mothers of Aboriginal babies could also access culturally safe services because they were still considered part of the community.

So when we look at a holistic thing so that non-Aboriginal mum that's pregnant within our Aboriginal community, even though she's not seen as Aboriginal she's still seen as a part of our community (Louise, AHW)

Another suggestion was issuing all women with a concession card during their pregnancy to ensure that dental services were accessible to all women. Some participants were cautious about the potential for further discrimination if only Aboriginal women received a priority referral.

It could work from once - like from my perspective then all - well not just Aboriginal women, all women who are pregnant, there's a guideline that they have to book in before 20 weeks gestation. So, everyone is under that umbrella, who knows whether they've been booked in or not, and that's including Centrelink and everyone else…so every antenatal mum who has booked in why can't they be issued with a healthcare card for the duration for when she's pregnant? Why can't that be an open healthcare card that's given to all regardless of how much you earn and things like that? (Tess, AHW)

But how that's rolled out, there needs to be some sort of consultation around it to be mindful about stigma that's already attached, you know, prejudice that's already attached…my worry would be how it's done, done in the best way (Louise, AHW)

Discussion

This study sought to understand the perspectives and experiences of AHWs, FPWs and Aboriginal management staff to inform a model of care that could address the oral health needs of Aboriginal pregnant women and new mothers within the community. The Aboriginal health staff acknowledged that promoting oral health among Aboriginal pregnant women could be a part of the role of AHWs and FPWs, which is a first in Australia. The components of a new model would need to include capacity building AHWs and FPWs in oral health promotion using training that follows Aboriginal ways of doing and implement strategies that escalate the cultural safety of dental services. More broadly, policies need to be negotiated with governments and ACCHSs to better address the oral health needs of Aboriginal women.

To provide enhanced oral health care for Aboriginal women during pregnancy, the Aboriginal health staff identified that the AHWs and FPWs could play a role if training is provided. Although some participants had knowledge about maternal oral health, this was learned informally and did not provide the staff formal qualifications. This is unsurprising as a recent review [34] found that no antenatal oral health training programs have been developed and evaluated for Indigenous health workers globally. Furthermore, there are currently no national perinatal oral health workforce strategies in Australia. However, oral health training for AHWs and FPWs, who already provide antenatal services, could further redress the impact of colonisation by providing an opportunity for Aboriginal women to receive oral health knowledge in ways that are culturally safe. Some studies with Australian Aboriginal communities revealed that the effectiveness of a health program is linked to how well the program adopts the community's cultural practices and knowledge, and directly involves the community [41–44]. In the context of PAR which is informing the larger program of research, the team (including the Aboriginal health staff) will need to design the training program, based on the suggested content and delivery, using the insights gained through these focus groups. Potential solutions to improve culturally safe care within the public dental service, such as involving Aboriginal dental staff at all points of care, will also need to be integrated in a model of care.

Yet, promoting oral health among Aboriginal pregnant women needs to be through Aboriginal ways of doing. Building trust with clients was important because it was the way that the AHWs and FPWs could effectively support clients to make informed decisions, and take action,

about their health. The priority to build trust changes the dynamic in the health provider-client relationship to one that is comparable to a partnership. As discussed by Karina and Tess, trust is built through yarning, a traditional method of knowledge exchange in Aboriginal cultures [45]. Gaining and maintaining this trust through yarning could be a potential factor to building sense of self-efficacy [18]. Listening to the shared experiences of AHWs and FPWs may provide some clients the psychosocial support necessary to seek dental care. This type of support was an important factor identified by Kong et al. [21] in maintaining oral hygiene practices among Indigenous women. Yet, trust with an individual care provider has its limitations when situated within the broader healthcare system [46].

The long-term effects of colonisation and intergenerational trauma are two main factors that have, and continue to, generate distrust and fear of health systems among Aboriginal peoples. The Aboriginal staff shared specific experiences where people refused to access mainstream health institutions. The government policy of assimilation, where Aboriginal children were forcibly removed from their families, has led to a significant loss in identity, culture and family connection, resulting in intergenerational trauma [14, 16]. This in turn has resulted in a pervasive fear and distrust among Aboriginal peoples when accessing and engaging with mainstream health institutions. The participants' discussion around shame and fear of being judged for having poor oral health highlighted a systemic problem among health care services failing to deliver culturally safe care [47, 48]. Some mainstream health care services have attempted to address the cross-cultural gap by employing AHWs to engage with Aboriginal clients [49]. In a similar model, public dental services could redress some of the effects of colonisation and mitigate some of the fear by having an Aboriginal person as the first point-of-contact over the phone to manage dental appointments. Employing at least one Aboriginal person at each dental clinic would also facilitate culturally safe continuity of care. Thus, there is the need for both the system and its health care providers to focus on providing care that aligns with Aboriginal ways of doing.

The prerequisite of Confirmation of Aboriginality to some ACCHS dental services reveal the cycle created by historical colonising policies, which initially excluded Aboriginal peoples from receiving culturally safe health care, and inadvertently continues to exclude Aboriginal peoples from culturally-specific health care services. Some Aboriginal women experienced increased difficulty obtaining Confirmation of Aboriginality if they had relocated from where they were known by community or could not reconnect with community because of the past policy of assimilation. Given that some non-Aboriginal people fabricate being Aboriginal to access affordable dental services, this highlights issues with the cost of dental services more broadly. Difficulties with affording regular private dental treatment is a challenge for both Aboriginal and non-Aboriginal Australian families [50]. These complex issues should be discussed with government policy makers and ACCHSs to explore relaxing stringent eligibility criteria to dental services during pregnancy, and better address the needs of Aboriginal families.

The barriers to dental care demonstrate the need for provision of culturally safe and inclusive continuity of care. However, Aboriginal care providers may need to negotiate with the policies of a non-Indigenous organisation and draw on inherent Aboriginal ways of knowing and being to provide this care [51, 52]. To practically support Aboriginal staff who navigate these two worlds, a range of referral pathways into public, private and ACCHS dental services need to be implemented so that all women pregnant with Aboriginal babies can access dental care, irrespective of Aboriginal status. In the UK, free dental treatment is offered to all women during pregnancy and up to 12 months after delivery [53]. In one Australian study, promoting oral health and subsidising the cost of dental check-ups significantly increased access the dental service during pregnancy [30]. Although subsidising dental check-ups may be costly initially, offering pregnancy dental checks may be more economical as it promotes long term preventive dental care for both the mother and the child [54].

Despite the strengths, there were some limitations in this study. The AHWs and FPWs who participated worked in an urban area; therefore, the perspectives of AHWs and FPWs working in regional or remote areas were not identified. As every Aboriginal community is unique, the perspectives shared are not intended to be representative of other AHWs or FPWs. Moreover, the AHWs or FPWs were not trained and employed to collect or analyse the data due to the heavy workload capacity of AHWs and FPWs and restrictions in funding.

Conclusions

The perspectives of Aboriginal health staff, who work within antenatal services, has provided valuable insight into the complexities and potential solutions around oral health among Aboriginal pregnant women and new mothers. Some of the challenges experienced by Aboriginal women highlight the need for changes in policy around accessing dental services. The AHWs and FPWs identified their role in promoting oral health as part of a new model of care. However, formal oral health training for AHWs and FPWs is still needed. To increase cultural safety, a proposed model could include Aboriginal staff who are present at every stage of a dental referral pathway to facilitate continuity of care. Future research and development of this model of care should be developed with the AHWs and FPWs using a PAR approach to ensure it is culturally safe and addresses the maternal oral health needs of Aboriginal women.

Supplementary information

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Additional file 1. (DOCX 14 kb).

Abbreviations

AHWs: Aboriginal Health Workers; FPWs: Family Partnership Workers; ACCHSs: Aboriginal community controlled health services; AMS: Aboriginal medical service; PAR: Participatory Action Research

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Authors' contributions

AK, MSS, LR, JG, KG, NJ, RS and AG were involved in the conceptualisation of the study and the design of the study. JG and MD also provided Aboriginal cultural health and wellbeing expertise. JG supported participant recruitment. AK and LR were involved in the acquisition of the study findings whereas AK, FT and MSS were involved in the analysis of the study findings. AK, MSS, LR, MD, JG, KG, FT and AG all contributed to the interpretation of the findings. AK completed the first draft of the manuscript. MSS, LR, JG, KG, MD and AG provided substantial revisions to the manuscript. All authors have read and approved the submitted manuscript.

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Availability of data and materials

The data used and/or analysed for this study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical approval was obtained from the South Western Sydney Local Health District Human Research Ethics Committee (2019/ETH09963) and the Aboriginal Health & Medical Research Council (1438/18). Reciprocal approval was also granted from Western Sydney University (RH13086). Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Chapter 8: Results (Phase 1B)

8.1 Overview

Paper 4 presents the second part of the qualitative findings on the experiences and perspectives about oral health of Aboriginal women who were pregnant, or recently gave birth. This paper also informed the development of the model of care.

8.2 Citation: Paper 4

Kong A, Dickson M, Ramjan L, Sousa MS, Goulding J, Chao J, George A. A Qualitative study exploring the experiences and perspectives of Australian Aboriginal women on oral health during pregnancy. International Journal of Environmental Research and Public Health. 2021;18(8061). doi: 10.3390/ijerph18158061

8.3 Aims: Paper 4

This study aimed to understand the oral health perceptions and needs of Aboriginal and Torres Strait Islander women during pregnancy. Specifically, this study explored whether oral health was important and could be promoted by Aboriginal health staff, and strategies that would be appropriate to use in a model of care.

8.4 Conclusion: Paper 4

The findings from this study elucidated the oral health needs and perspectives of Australian Aboriginal women during pregnancy, which included support of the potential role of antenatal care providers to promote oral health. The perspectives of Aboriginal women revealed the various barriers and complexities that affect the prioritisation of oral health, which included competing responsibilities, costs of dental services, long waiting times, ineligibility, limited awareness and information, and difficulties engaging with certain dental services. However, antenatal care providers, like AHWs, who have established trust with clients, could provide tailored oral health advice and support oral health self-efficacy.

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Article

A Qualitative Study Exploring the Experiences and Perspectives of Australian Aboriginal Women on Oral Health during Pregnancy

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Abstract: The aim of this study was to explore whether oral health was an important consideration for Aboriginal and Torres Strait Islander women during pregnancy, whether oral health could be promoted by Aboriginal health staff, and strategies that would be appropriate to use in a new model of care. A qualitative descriptive methodology underpinned the study. All participants in this study identified as Aboriginal, with no Torres Strait Islander participants, and were from New South Wales, Australia. The interviews were analysed using inductive thematic analysis. From the data, two themes were constructed. The first theme identified that oral health was not always the first priority for participants as poor accessibility alongside other competing commitments were challenges to accessing oral health services. The second theme highlighted how relationships with personal networks and healthcare providers were essential and could be used to support maternal oral health during pregnancy. Effective strategies to promote oral health during pregnancy for Aboriginal and Torres Strait Islander women should involve key stakeholders and health care providers, like Aboriginal Health Workers, to facilitate culturally safe support and tailored oral health advice.

Keywords: indigenous; aboriginal; pregnancy; oral health; qualitative; interview; culturally safe; Australia

1. Introduction

Globally, Indigenous pregnant women need culturally safe antenatal support to ensure good health and wellbeing [1,2]. In the Australian context, Aboriginal and Torres Strait Islander peoples experience poorer health outcomes at birth and across the lifespan compared to other Australian peoples [3]. In Australia, Aboriginal and Torres Strait Islander peoples are respectfully referred to as the diverse groups of peoples and nations who were the first custodians and owners of the land [4]. Improving maternal health during pregnancy offers an opportunity to contribute to closing the gap in health inequalities between Aboriginal and Torres Strait Islander children and other children. Maternal oral health is an important area that tends to be overlooked among many women during pregnancy [5].

Antenatal oral health can impact both the mother's health outcomes and that of her child after delivery [6]. Periodontitis (gum disease) is common among pregnant women [7] and is associated with adverse maternal and delivery outcomes including pre-eclampsia, low birth weight and pre-term birth [6]. Poor maternal dental health is also linked to an increased risk of children having early childhood caries (ECC) and poor oral health over the child's lifespan [8].

ECC is common among young children, and it disproportionately affects Aboriginal and Torres Strait Islander Australian children compared to other Australian children [9,10]. ECC impacts a child's quality of life and development, and is also expensive to treat [11]. Yet, ECC is preventable through oral health promotion [11]. Promoting oral health messages that encourage oral hygiene practices, such as tooth-brushing and accessing the dentist, benefits the pregnant woman. Mothers who adopt preventive dental behaviours are likely to teach these practices to their children, which can reduce the risk of ECC [12]. Despite the opportunity to improve this area of inequality for Aboriginal and Torres Strait Islander mothers and children, a recent study found that among Aboriginal and Torres Strait Islander women with young children in one community, none of the women recalled receiving any education or information about oral health during pregnancy [13].

There is the need to promote oral health among Aboriginal and Torres Strait Islander pregnant women, however the legacy of colonisation and intergenerational trauma in Australia continues to be a barrier for many people to engage with government institutions and health services [14]. Aboriginal and Torres Strait Islander women may also experience systemic barriers to accessing dental services [15] including racism [16], and feelings of fear, shame and judgement that result from historical factors [14]. Other barriers to dental care include ineligibility for public dental services, difficulties acquiring a Confirmation of Aboriginality to access Aboriginal community-controlled health services (ACCHSs), high dental costs in a private clinic [14], poor self-efficacy and past dental attendance [17]. In Australia, a Confirmation of Aboriginality refers to a document, typically issued by an Aboriginal community-controlled organisation, certifying that an individual identifies as being of Aboriginal and or Torres Strait Islander descent, and is accepted as being in the community that the person resides or previously resided [18,19]. These documents may be required to access certain Aboriginal community-controlled health services; however, they are also difficult to acquire where family have been removed from their communities because of past assimilation policies [19]. These barriers to dental care highlight that, even if Aboriginal and Torres Strait Islander women receive education about oral health during pregnancy, there remains a need for services to provide continuity and a more coordinated approach to dental care that is underpinned by cultural safety and competence [15].

Currently, many Australian women do not access the dentist during pregnancy [5]. An antenatal oral health program involving trained midwives has been developed and rolled out across Australia in response to the poor awareness and uptake of dental services among pregnant women [20,21]. However, this model of care may not be culturally appropriate nor address the specific needs of Aboriginal and Torres Strait Islander women who may access antenatal care providers other than midwives [22].

Aboriginal and Torres Strait Islander women need to be involved in the development of culturally safe antenatal services that promote oral health during pregnancy if they are to be effective and sustainable [23]. The aim of this study, therefore, was to understand the oral health perceptions and needs for Aboriginal and Torres Strait Islander women during pregnancy. This study specifically explored whether oral health was important for Aboriginal and Torres Strait Islander women during pregnancy, whether oral health could be promoted through Aboriginal health staff inclusive of Aboriginal Health Workers (AHWs) and Family Partnership Workers (FPWs), and strategies that would be appropriate to use in a model of care.

This study is part of a larger program of research, informed by Participatory Action Research (PAR) methodology [24], that aims to pilot test an oral health model of care designed specifically for the community. This larger study was conceptualised with the

Aboriginal health staff who support the delivery of antenatal care to Aboriginal and Torres Strait Islander pregnant women in two different Greater Western Sydney (GWS) areas in New South Wales, so that the priorities of Aboriginal and Torres Strait Islander pregnant women would be addressed. The staff identified a need to promote oral health among Aboriginal and Torres Strait Islander women during pregnancy.

There is currently a lack of policy and appropriate interventions to inform a model of care that would address the specific oral health needs for Aboriginal and Torres Strait Islander pregnant women. The Aboriginal health staff specified that to develop a culturally appropriate intervention, focus groups with Aboriginal health staff would need to be conducted followed by yarning with Aboriginal and Torres Strait Islander pregnant women. The focus groups with the Aboriginal health staff, inclusive of AHWs and FPWs, have already been reported elsewhere [14]. Although Aboriginal and Torres Strait Islander is the preferred term to describe the original custodians of Australia, the term Aboriginal will be used to respectfully refer to the women who participated in the study as none of the women identified as Torres Strait Islander.

2. Materials and Methods

2.1. Qualitative Methodology

A qualitative descriptive methodology underpinned this study to understand the perceptions relating to oral health for Aboriginal and Torres Strait Islander pregnant women. A qualitative descriptive methodology enabled the research team to stay close to the participants' words and experiences [25]. This was important to ensure an in-depth understanding of socially and culturally constructed phenomena, initially focusing on a literal description which moves beyond into an analysis and interpretation of the meanings participants ascribe and the language they use to shape their realities. This exploratory study aimed to generate new knowledge to inform an oral health model of care, using semi-structured interviews to provide richness to the data. It also allowed exploration of other emerging issues while maintaining a focus on oral health, thereby enhancing both depth and rigor.

Qualitative research approaches have informed interdisciplinary oral health models of care involving the broader health workforce in other populations [26–28]. In general, these qualitative studies commenced by identifying existing needs and perspectives of key stakeholders and then explored components of an acceptable, feasible and practical oral health model of care. The current study was conducted using a similar approach which then informed the larger model of care.

2.2. Maintaining a Cultural Lens

The lead author (AK) identifies as a non-Indigenous woman with experience in qualitative research. As part of AK's work as a researcher on the larger study, she has engaged with two local Aboriginal communities in Sydney (NSW) for over two years. AK developed relationships with these communities through yarning with AHWs and FPWs, and by participating in community events.

Ethically, it is essential that Aboriginal and Torres Strait Islander governance guides the research. In this study, Aboriginal researchers with expertise in Aboriginal and Torres Strait Islander research and clinical service delivery were actively engaged in key areas of the research. Aboriginal researchers informed study decision making (JG, MD), informed the data collection process (JG, MD), co-analysed the data and informed the interpretation of the analysis (JC, JG, MD).

2.3. Context

This study was based in NSW, where a third (33.3%) of the identified population of Aboriginal and Torres Strait Islander people in Australia reside [4]. Most participants were recruited from a GWS urban area. The GWS area spans a large geographical region across 14 local government areas [29]. Although Sydney is a metropolitan city, some GWS

residents live on the rural-urban fringe and have quite different needs to more urban-dwelling residents. Extending recruitment to participants outside the GWS urban areas meant that the perspectives of women in these regions could be included. Compared to people living in GWS urban areas, residents in GWS rural or peri-urban areas generally travel longer distances to access health services that tend to be smaller and have less resources [30,31].

2.4. Sampling and Recruitment Strategy

Both purposive and snowball sampling techniques were used to recruit Aboriginal and Torres Strait Islander women who were pregnant or had a child less than a year old. The latter were included as some Aboriginal staff (AHWs and FPWs) were concerned that some women would not have had the opportunity to participate because of other commitments during pregnancy. Women younger than 18 years of age or had high risk pregnancies and were prescribed bed rest by their healthcare provider were excluded.

Participants were recruited for interviews through a flyer posted on the Facebook page of a research centre for Indigenous health (n = 2) and by word-of-mouth (n = 3). Some participants residing in the GWS area were recruited through antenatal health workers (midwife, AHW, FPW) (n = 7). AK provided further information about the study to interested participants and arranged a time and place for the interview. Participants were e-mailed or given a participant information sheet in person, and AK discussed the details of the study with them before obtaining verbal and/or written consent. AK emphasised that all information would be de-identified and confidentiality would be maintained. To build rapport and trust, the interviewer shared about herself and then asked the women about their background, how they identified as an Aboriginal and Torres Strait Islander person (for example, through their mother or father), and the mob or community they identified with.

Participants were recruited until a data saturation was reached [32]; that is, when no new concepts relating to the study aims were identified. Due to the richness and specific focus of the data, the sample size (n = 12) was sufficient for this study. A recent systematic review of interview=based qualitative studies found that sample sizes as small as eight or ten are appropriate due to the exploratory nature of the topic area [33].

2.5. Demographic Information

The 12 Aboriginal women who participated were between 18 and 36 years of age (median 27.5 years). About half were pregnant (n = 7), and in the second trimester (between 14 to 24 weeks' gestation). All post-partum participants (n = 5) had an infant between three and six months of age. Some women (n = 8) had up to three other children and almost all women lived with a partner (n = 10). Most participants resided in Sydney (n = 10). The other two women (Vivian and Belinda) resided in a rural community. Eight participants were employed at the time of the interview. Of the women who were employed, four were on leave. Madison was employed as a case worker, Kelly was a social worker and Ella had a finance and administration role at a not-for-profit organization. Hannah worked part-time at a supermarket whereas Leah had worked in retail casually. Two women, Vivian and Jane, had some experience working as dental assistants whereas Belinda identified as an AHW. Although Audrey was studying for a diploma, she worked previously as an early childhood educator.

2.6. Ethical Considerations

Ethical approval for this project was granted by the Aboriginal Health & Medical Research Council (AH&MRC) Human Research Ethics Committee (1438/18) to ensure that the research would be useful, ethical, and valid to Aboriginal communities in NSW. The study was also approved by the South Western Sydney Local Health District (SWSLHD) Ethics Committee (2019/ETH09963), with reciprocal approval granted from Western Sydney University (RH13086). Obtaining approval from both the AH&MRC and SWSLHD human

research ethics committees required that the study aligned with the ethical guidelines for research with Aboriginal and Torres Strait Islander Peoples [34]. All participants were given a gift voucher (AUD 50) as reimbursement for their time. Verbally recorded or written consent were obtained from all participants.

2.7. Data Collection

All interviews were conducted by AK between August and November 2019. Women were offered the option of either face-to-face or telephone interviews and could bring a support person to the interview. Eight interviews were over the telephone and four were face-to-face. Face-to-face interviews were conducted at a place chosen by each woman, depending on the woman's needs (at the participant's home, in a secluded outdoor area and in a private room at a community health centre); light refreshments were also offered. A support person was present in one interview (conducted face-to-face). In another, the interview was held at the participant's house; a colleague of AK was present as part of the protocol to have two people present for initial home visits. All telephone interviews were conducted in a private room. AK recorded the interviews, and wrote memos during, and immediately after. The semi-structured interviews were between 21 to 77 min. The interview guide can be found in Supplementary Material 1.

2.8. Data Analysis

The audio recordings were professionally transcribed, and transcripts were checked by AK. At the conclusion of two interviews, the participants asked AK to censor parts of the interviews. These sections were censored on the transcripts by AK prior to analysis. All participants were de-identified and assigned a pseudonym for confidentiality. The analytical framework described by Braun and Clarke [35] guided the inductive thematic analysis that was used to analyse the data. There are six phases in Braun and Clarke [35]'s framework. As part of the first phase, Familiarising yourself with the data, AK and JC independently read and re-read transcripts to facilitate immersion in the data, each writing memos to capture researchers' initial thoughts. Memos are a flexible, analytical strategy to assist with interpreting the phenomena shared by the participants [36]. The memos provided AK and JC reflections for further consideration during the thematic analysis process. For the second phase, Generating initial codes, AK created initial codes using NVivo 12 (a qualitative analysis software). AK and JC independently created categories from the initial codes (five and eight, respectively). AK and JC co-constructed five preliminary themes for the third phase, Searching for themes. As part of phase four, Reviewing themes, preliminary themes were discussed with the team. The team then independently reviewed the transcripts and a second meeting was convened to refine the themes until consensus was reached; at that point in the analysis, the five preliminary themes were condensed into two main themes and corresponding sub-themes. This process of refinement and consensus reflected phase five of the framework, Defining and naming themes. For the final phase, Producing the report, the themes and sub-themes were identified, defined and described in this study. The involvement of Aboriginal and Torres Strait Islander researchers was indispensable to ensuring that the Aboriginal subtext (social, cultural and historical context) and assumptions underlying the experiences shared by the participants were meaningfully interpreted through a cultural lens [35].

3. Results

From the 12 interviews, the authors constructed two themes, using thematic analysis, relating to oral health during pregnancy (Table 1).

Table 1. Themes and sub-themes.

Main Theme	Sub-Theme
Theme 1: The priority of oral health during pregnancy	• Oral health concerns and behaviours • Issues with accessing dental services • Knowledge and attitudes towards oral health care • Juggling competing priorities
Theme 2: Supporting maternal oral health self-efficacy through relationships	• Connection and trust with healthcare providers • Seeking information to inform oral health choices • Tailoring oral health promotional resources

3.1. Theme 1: The Priority of Oral Health during Pregnancy

Most women had oral health concerns during pregnancy. Although the participants had different knowledge levels; access and cost of dental services, transport or juggling other responsibilities, meant that the participants prioritised meeting the more basic needs for their family first over oral healthcare during pregnancy.

3.1.1. Oral Health Concerns and Behaviours

Oral health was a concern for most women in this study. Most participants experienced an increase in oral health problems during pregnancy, which either appeared during pregnancy or were exacerbated during pregnancy. Vivian described her experience of this:

> *I've never had [dental] decay in my life . . . The only issue I had while pregnant is I got gingivitis, um, and it flared up really bad. And I reckon the minute I gave birth, it all just cleared up.*

These oral health problems included pain, tooth sensitivity, pregnancy gum tumours, bleeding gums and broken teeth. Miranda and Belinda both shared about their oral health problems in pregnancy:

> *My oral [health] was really bad. I had a previous drug history, so obviously that rotted a lot of my teeth . . . The pain was horrible, absolutely horrible.* (Miranda)

> *They told me I had pregnancy tumours. My gums were coming away from my teeth. I had good oral hygiene, but I don't know what happened . . . They said it stemmed from being pregnant, which made it of course, worse.* (Belinda)

Although some women reported no changes in oral health practices or routines during pregnancy, other participants increased the frequency of regular oral hygiene practices (particularly toothbrushing):

> *Same as . . . pre-pregnancy, which would be brushing my teeth twice a day.* (Kelly)

> *Since I've fallen pregnant, I don't like any aftertaste of anything in my mouth, so there's days where I might even brush my teeth four or five times a day.* (Alice)

The participants also talked about the frequency of dental visits during pregnancy. Although most women accessed a dentist in the past year, some participants reported visiting regularly. Some participants attended the dentist either shortly before, during or after their pregnancy. However, a few women, like Kelly, explained that visits to the dentist were only prioritised if there was an urgent oral health problem:

> *I haven't gone to the doctor—the dentist, in quite a long time and everyone I know don't go to the dentist—unless it's to the dental hospital . . . for emergencies*

3.1.2. Issues with Accessing Dental Services

The participants described various challenges to access dental services to address oral health needs. Some women, like Belinda, described how the waiting list to ACCHS and public dental services were often very long:

> *You can't ring up the hotline and say I'm due for my six-month check and they'll just basically say all right, you're on a waiting list, because everyone else that rings up and says I'm in constant pain and I have an abscess, they'll bump up before ya.*

Vivian, a dental worker, also expressed frustration with the protocols to book a public dental appointment:

> *Look, our call centre is no good. It needs to go I personally think. I think we've lost a lot of patients because of that. I have contacted that same call centre to make an appointment for my kids to be seen and I waited 40 min . . . I think we should make our own appointments. It shouldn't go to a call centre.*

Of the women who saw the dentist, five accessed private dental services, three to public dental services, and one accessed an ACCHS. A few women, like Jane who used to be a dental assistant at a private clinic, were not aware that dental services provided by public or ACCHS were available:

> *I actually didn't even know that there were Aboriginal health clinics . . . I didn't know that that was available to us as well.*

Other participants, however, found that certain policies were a barrier to accessing public and ACCHS dental services. Belinda explained that the income she earned during pregnancy made her ineligible for a Health Care Card, a concession card which would enable access to subsidised dental care from the public dental service [37]:

> *I wasn't eligible to go in the public [dental] system because I was working at the time, so therefore I did not have the Health Care Card . . . [for the public dental service] you have to [be] on either a Health Care Card or Pension Card. So for everyone else—even if you're working, like you could be working but still be low income, but still not be able to [be put on] cards, you can't access the dentist.*

Miranda also described how access to the local Aboriginal community-controlled dental clinic required a Confirmation of Aboriginality, which was difficult to obtain.

> *I can't get my [Confirmation of Aboriginality] papers because they can't track back far enough...*

Few participants described how accessing ACCHS dental services was not always ideal because of the community conflict that can sometimes influence a decision to engage or disengage with an ACCHS. This barrier to accessing services was a described by Vivian:

> *If an Indigenous family doesn't like that family they won't go to that clinic [managed by that family]. So, I think that's another massive . . . they don't want to walk into that place because they feel like there's no confidentiality in that workplace.*

A few women both from rural and urban areas also disclosed feeling insecure with confidentiality when attending a service in a close-knit community. Madison spoke of her experience of this:

> *Sometimes it's not good to see someone who's Aboriginal because we know each other . . . Communities are small . . . so sometimes it's better not to have someone who's Aboriginal come in and see your—you know, health business.*

The cost of private dental services was also a barrier. Some women, like Belinda and Ella, who accessed private dental services spoke about saving for appointments or using a payment plan to cover the cost of dental procedures:

The first pregnancy it was a major issue. Like, um, back in 2010, didn't have much access or even financial—to go the dentists?... I was able to save and save and save money to go to a private dental clinic . . . [to save took] Probably two years (Belinda)

But my dentist does offer a payment plan which is, well, I'm not sure if all of them do, but if you have a procedure done, you can pay off a little bit at a time, which I've done that before. (Ella)

Participants, like Kelly, also managed finances to ensure that essential needs for the family, like food, were met over personal oral healthcare needs:

I'm about to have a baby and I don't have $200 to spend. It's [dental] not covered by Medicare...I would rather buy groceries for the week, quite frankly. (Kelly)

3.1.3. Knowledge and Attitudes towards Oral Health Care

The participants had different attitudes and levels of knowledge about oral health. Jane and Vivian both worked in a dental setting whereas Belinda identified as a maternal and infant AHW; all three women shared a wealth of oral health knowledge and its link to pregnancy. Vivian spoke of this:

So basically if you have bad teeth, if you have decay you can be ill, it can make your baby ill.

Ella, who grew up learning about oral health from her parents, also spoke about the importance of maternal oral health:

I think it was something that was embedded in me growing up as a child, and I do remember the dentist used to come to our school and do our teeth, so. My parents were always big on protecting your health and your mouth and all that type of thing. (Ella)

Some women, like Madison, were unsure about the need for, or safety of, dental treatment during pregnancy:

Like, am I able to go to the dentist? Are they able to rip out teeth? Like do you know what I mean—anaesthesia like all that kind of stuff. What if I need work? Like I have no idea. (Madison)

There were also some misconceptions about oral health during pregnancy, including that the baby draws nutrients from the mother's teeth. Hannah described her belief about this:

I know obviously when you're pregnant the baby takes a lot from you, so your teeth get very weak . . . you've got to take extra care because they've taken all your nutrients and everything.

Most women, like Alice, also discussed how dentists, or going to the dentist, invoked feelings of anxiety or fear for themselves or the baby:

I worry a lot ab out going to a dentist and things like that . . . you just get a bit nervy I suppose.

For some women, the anxiety stemmed from negative past experiences with dentists. Miranda remembered a fear of dentists stemming back to her childhood:

I've just always had a fear of dentists. I think a lot of it has to do from when I had to get my fillings when I was younger. You know how the dentists go to the schools . . . they did a bit of a hack job.

3.1.4. Juggling Competing Priorities

Various participants described various other priorities that needed to be juggled, and sometimes made it challenging to access the dentist. Participants, like Madison, highlighted the difficulties in accessing the dental service due to other commitments:

> *Like where do you find the time to go the dentist amongst everything else that you kind of have got on?*

As eight women also had other children, a few mothers spoke about the difficulties of managing children to attend a dental appointment. The lack of time to prioritise a dental appointment was also inferred, particularly if there was limited personal support to supervise the participant's other children, or restricted opening hours at the dental clinic. Alice and Jane described how they face those challenges:

> *I come from such a small town. There's a lot of convenience there and that, whereas here, it's a bit of a challenge to get to the supermarket, get the kids in and out of the car and try and get things done and try to get to my appointments and things like that.* (Alice)

> *My mum and that finishes early, work, around three [to mind the children]. So, if I made a late appointment I could just leave—later in the day. I suppose it depends on the hours too. How late they're open...* (Jane)

The time taken to travel to dental appointment can be a concern for women in rural areas. Transport was not a concern for any of the women residing in urban areas. In rural areas, however, the time taken to travel to dental services was a disincentive to attend dental appointments, even when community transport was available. Vivian described this:

> *So [towns] are two and a half hours away too . . . Some of them do come on community transport. But you know what? A lot of those leave at six, seven o'clock in the morning because they don't just take that one person . . . So, therefore, I reckon—out of town communities that come to my work, I reckon ninety percent of them don't show up . . .*

3.2. Theme 2: Supporting Maternal Oral Health Self-Efficacy through Relationships

The participants described how relationships with both healthcare providers and personal networks were beneficial to supporting oral health. Developing trust and connection with healthcare providers was important to tailor oral health advice and enabled participants to make informed oral health choices.

3.2.1. Connection and Trust with Healthcare Providers

The women spoke about various experiences and perspectives on the importance of developing connection and maintaining trust with healthcare providers. These healthcare providers took the time to know the personal needs of the mother and spoke in ways that did not make the mother feel uncomfortable. Participants, like Audrey, also described instances where healthcare providers (including dentists, midwives, doctors or AHWs) had cultivated trust:

> *Um, I was—she [midwife] explained stuff really well and the questions that she asked, she didn't make me feel like it was uncomfortable to speak to her*

Having an Aboriginal healthcare provider was important for some women, like Ella:

> *I think the trust and that level of care you can relate to on a cultural basis that you can't get with other doctors.*

Hannah explained that there was a sense of being welcomed by Aboriginal services that enabled connections to be made more easily with other Aboriginal people:

> *I like to stick with the Aboriginal services . . . Plus, I've had them—since basically my daughter was—I was pregnant with my daughter they've always been there and helped me.*

Upbringing as a child appeared to influence the connections built with healthcare providers. A few participants, like Alice and Audrey, had maintained relationships with the same healthcare providers from their childhood.

> *I've grown up going back and forth to the dentist most of my life . . . I usually go to [the dentist]—where I come from, one back down home* (Alice)

> *I see the same doctor I seen as a child at the medical and dental centre* (Audrey)

For other women, like Ella, being able to develop a healthy, trusting relationship with a healthcare provider (including dentists) as a child influenced healthcare access as an adult:

> *I always had a dentist that I went to growing up that I really trusted, and I must say I'm scared of dentists. [laughs] So, when I found one, I could really trust, I just stuck with them. Yeah, and it's just the security of knowing that, okay, I can trust you . . .*

3.2.2. Seeking Information to Inform Oral Health Choices

Almost all participants spoke about their experiences or attitudes about seeking information or education so they could make informed oral health choices for themselves and for their baby during pregnancy. Vivian and Miranda reflected on the need for oral health education for women during pregnancy:

> *I think education is just the biggest key. For people who have bad teeth they don't realise that what they're giving their child is bad.* (Vivian)

> *But I don't like needles and I don't like dentists, [laughs] so I refused to go [to the dentist]. But I had no choice . . . Like I have to have them [needles] . . . For the baby, for myself, I need to be alive for my kids. I can't afford to get sick.* (Miranda)

The information received from antenatal healthcare providers, however, was not consistent across participants, and the difference in quality of information received resulted in different choices being made. For example, Miranda suggested that if she had more information she would have had an earlier visit to the dentist:

> *I didn't think it would hurt the baby...If I would have known that, I would have gone to the dentist a hell of a lot earlier.*

A few women received oral health advice from midwives, as described by Kelly:

> *I didn't even know it [oral health] was important during pregnancy until the midwife told me...They're not actually one hundred per cent sure why I need to go the dentist but apparently, I do.*

However, other participants took an active role in recruiting health professionals to provide information to others. For example, Belinda spoke about organising dental therapists to provide advice to a mothers group:

> *But I've had them [dental therapists] come to . . . a mother's group [that I run] and explaining about dental issues...*

Where specific advice was not given by a health professional, search engines were used by a few participants to seek information. Ella saw this as problematic, and emphasised that seeking knowledge through a search engine was not ideal due to the conflicting information found online:

> *The worst thing I want to do is Google, because they're saying don't take this and don't do this, and the information was conflicting.*

3.2.3. Tailoring Oral Health Promotional Resources

The participants spoke about the need and types of oral health promotional resources and information that would be appropriate. However, almost all participants also highlighted the need for face-to-face education to accompany the resources. This was because in face-to-face education sessions, questions could be answered immediately by the health professional and certain practices could be shown. Hannah and Jane spoke of this preference:

> *I think face-to-face is better and obviously if you have questions to ask you can ask there and then.* (Hannah)

> *That [face-to-face] was probably more effective, I suppose, compared to any pamphlet you would get. They're [midwife] able to be there and show you exactly how you should be doing it and, yeah, give you tips as well.* (Jane)

The preferred delivery for advice may also depend on personality types. Sasha, who mentioned that she can get quite shy with face-to-face interaction, preferred to receive advice through text messages:

I'm a text message sort of person … I get very shy …

While group education sessions were acceptable for a few participants, other participants preferred to receive education one-on-one. Audrey commented that in some group education sessions, facilitators may put certain people on the spot:

I'm okay with one on one, but I don't like group chat...Sometimes I feel like I'm being—you get put on the spot.

However, Belinda, who was from a rural community, explained that group education sessions could be helpful for some stay-at-home mothers:

then they [mothers] can say … "I've learned all about this oral health"... they're stay at home mums, and then they come to mothers' group, it's getting them out of the house and they want to learn.

When asked about appropriate oral health resources that could be used to promote oral health, participants identified a range of resources including pamphlets, cards, fridge magnets, SMS reminders, e-mails, dental hygiene products and water bottles with dental messages. Different resources were preferred among the participants:

You can have a flip chart with a big picture enlarged... (Belinda)

Probably even just like a little pamphlet on dental maybe would have been good (Jane)

Pamphlets don't work, I find, because you get so many of them … I find—something that I would use—like dental oral hygiene, water bottles, fridge magnets, things like that (Kelly)

Participants suggested that the key messages on the resources should include the link between maternal oral health and the baby, the importance of healthy eating, brushing and dental check-ups, and behaviours that should be followed or avoided. Vivian sums up her thoughts on key messages:

Well, healthy eating, brushing. They would be my two major ones; keep brushing, eat healthy … Regular check-ups …

The participants also identified the need for more pictures for effective communication, as described by Leah who said, " … *Pictures on things to do and not to do*".

Including culturally appropriate illustrations to facilitate the delivery of oral health messages on the resources was also considered to be important. Specifically, Belinda recommended the need to use local content that included people who were recognisable to make the resource more culturally appropriate:

I think local content … try to go to different communities and have local people in the pamphlet, people they can relate to and like, "oh, I know that person. They're doing it." (Belinda)

Some women, like Alice, highlighted that it was essential to have the contact information to direct contact with a dental clinic, to have "*a number that I could call*".

When asked about using a screening tool, Vivian discussed that integrating a self-administered oral health screening tool on the resource could help pregnant women decide whether access to dental care was needed.

Screening, yeah. So … "do you have this?" and then a line would say yes or no and if she does go to this, that type of thing?... Yeah, I think that's good as long as you keep it simple, not heaps of words … I reckon keep it simple, a simple picture and yes or no's.

4. Discussion

This is the first study to extensively explore the oral health needs and perceptions of Australian Aboriginal women during pregnancy. This study also filled a gap in knowledge about the potential role of the broader health workforce in promoting antenatal oral health care and identified key supportive strategies to inform a culturally safe model of care. Importantly, this study highlights several barriers many pregnant Aboriginal women face in managing oral health. These include barriers previously identified in other studies with Indigenous pregnant women across the globe, such as the need to prioritise time and money on family needs and other responsibilities over personal oral health needs [37], cost of private dental services [13,15], long waiting lists [15], and a lack of eligibility for subsidised public and Aboriginal community-controlled dental services [14,38]. The findings from this study, however, also report other barriers for Australian Aboriginal women during pregnancy, including a lack of information about subsidised public and Aboriginal community-controlled dental services, protocols around booking an appointment at public dental services, and concerns around confidentiality in close-knit communities.

Numerous strategies were suggested to address these barriers and improve oral health of Aboriginal women during pregnancy. These strategies included developing a range of oral health promotion resources that are culturally appropriate and obtaining timely information about the impact of oral health on pregnancy. The findings found that information needs to be delivered face-to-face from a dental or other antenatal care provider that has an established connection with the Aboriginal woman. These strategies need to be considered when developing an oral health model of care for Aboriginal women.

An established connection and trust were essential in the promotion of oral healthcare by healthcare providers. The findings from this present study further indicate that relationships are important to support oral health and oral health self-efficacy. Sources of self-efficacy, which can impact on health behaviours and outcomes, includes encouragement from other people [39]. Australian research by Jamieson, et al. [40] and Ben, et al. [41] show that self-efficacy and possessing a sense of control are associated with improved oral health practices and self-rated oral health among Aboriginal pregnant women. Some participants drew on trusting relationships with healthcare provider to seek health advice. Thus, to discuss oral health within this context, healthcare providers need to establish rapport with clients. A previous study conducted with Aboriginal health staff identified that oral health can be a sensitive issue to discuss with some women [14]. From the perspectives of the participants, however, trust with a healthcare provider could mitigate some of the discomfort associated with discussing oral health problems.

Some women commented on the advantages of receiving care from ACCHSs and Aboriginal healthcare professionals. These advantages were attributed to feeling welcomed and being able to build relationships more easily with another Aboriginal and Torres Strait Islander person. Thus, Aboriginal health staff have a vital role as they possess a wealth of knowledge about culture and social practices and are likely to have culturally safe, effective communication skills to reach, connect and build trust when discussing oral health [42]. Walker, et al. [43] found that Indigenous Health Workers in remote Australia also recognised their potential role in promoting oral health as part of general health. The findings from this study found that some women were worried about confidentiality when disclosing oral health problems to Aboriginal health staff due to the close-knit nature of some communities. Although Aboriginal health staff endeavour to protect professional and personal relationships [44], some Aboriginal women may prefer to access non-ACCHSs. This implies that non-Indigenous health staff and services need to have the appropriate oral health training and support to ensure that Aboriginal women continue to receive culturally safe care. Non-Indigenous health staff also need to learn about how to best build trust, rapport and communicate in ways that are culturally appropriate.

Another key strategy for a model of care is to ensure that Aboriginal women have reliable and tailored oral health information. A review by McCalman, et al. [45] observed the importance of health promotion tools that are disseminated through facilitated imple-

mentation by Aboriginal and Torres Strait Islander people, rather than passive distribution. In an antenatal model of oral healthcare, passive dissemination of oral health resources or information would likely not be adequate. The participants in this study wanted to make choices based on quality advice given by an antenatal care provider. Some women received little or inconsistent information about oral health during pregnancy, and had to turn to online sources of information which are often unreliable. The lack of information given to Aboriginal women about oral health and pregnancy has also been identified in another Australian study [13]. The findings from the present study demonstrate the need for antenatal care providers to discuss oral health, which is recommended in Australian pregnancy care guidelines [46]. Antenatal care providers need to discuss oral health in relation to the client's personal needs and circumstances and identify strategies that could mitigate any challenges faced. Tailored oral health education and support may include timely oral health advice, advice on experiencing dental anxiety and information on accessing affordable dental services.

Based on the findings from this study, a potential culturally safe model of oral healthcare would involve the delivery of oral health and pregnancy advice by an antenatal care provider that the client trusts, such as an AHW, alongside culturally appropriate oral health promotion resources. Unfortunately, this proposed model of care would be limited by barriers like cost of dental treatment, which has also been found to be a barrier in other studies involving Indigenous pregnant women around the world [13–15]. As discussed in an earlier study with AHWs [14] and seen in our findings, the cost of dental care can still be significant for women who are employed but have other financial commitments, even though they may have an awareness about the importance of good oral health care. The findings from our study also identified a concern with the process of booking a public dental appointment, which can be another barrier to accessibility for some women. These factors continue to highlight the need for more pragmatic options for culturally safe dental care among Aboriginal and Torres Strait Islander women during pregnancy, such as changes in policy to provide oral health checks for all women during pregnancy [14] and streamlining appointment bookings as identified in this study. Furthermore, there is a need to capacity build AHWs and other antenatal care providers in promoting oral health among pregnant women, and to develop culturally appropriate oral health promotion resources.

The findings highlight several implications for policy and practice. Firstly, there is a need to focus on developing culturally safe oral health training for a large range of antenatal care providers, including AHWs, who are in contact with Aboriginal and Torres Strait Islander women during pregnancy. The way that dental services are delivered also need to be reconsidered. From booking appointments to post-treatment care, dental services need to be adapted to be more culturally safe. Existing external public dental and ACCHS policies also necessitate change to meet the oral health needs of Aboriginal and Torres Strait Islander women who may not qualify for affordable dental care at a time where more support may be required.

5. Limitations

There were some limitations to this study. Most of the participants resided in an urban rather than rural or remote area so the experiences shared from a rural perspective were limited. Most interviews were conducted over the telephone which may have affected openness and the interviewer's ability to read non-verbal cues. For some people; however, anonymity over the phone can enhance the amount of information shared with an interviewer [47,48]. Interviews that were over the phone were on average longer (45.6 min) compared to interviews face-to-face (29.5 min), and also explored the same topics in detail. Moreover, the participants who resided in an urban area could choose to have a face-to-face or telephone interview, depending on the woman's personal convenience and preference.

Future research needs to explore the oral health perspectives of Aboriginal and Torres Strait Islander pregnant women living in other settings. As this was an exploratory study,

larger cross-sectional surveys may also provide more insight into the factors that impact the oral health of Aboriginal and Torres Strait Islander women during pregnancy.

The interviewer also did not have a relationship with the Aboriginal participants prior to the interviews, which could have affected the participants' openness in sharing experiences or stories. Many participants were recruited through an antenatal health provider with whom they had established a relationship, which also contributed to the level of trust with the interviewer. Two women also had experience working as dental assistants, and one woman was an AHW, which may have influenced the findings. However, the involvement of these women enriched the study as they provided insight from both the perspective of a health care and oral health promotion as well as their lived experiences an Aboriginal woman within the community.

6. Conclusions

Despite the existing oral health and pregnancy guidelines and a recent focus on maternal oral health, it appears that the oral health needs among some Aboriginal women during pregnancy are still not adequately addressed. As oral health may not be prioritised due to the multiple responsibilities of the Aboriginal women, this topic needs to be raised by antenatal care providers like AHWs, who have established trust, to provide tailored and culturally safe oral health support and promote oral health self-efficacy.

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Chapter 9: Results (Phase 2)

9.1 Overview

This chapter presents the results from Phase 2 of the study. Paper 5 presents the findings of the embedded mixed-methods pilot study, describing the development of the Grinnin' Up Mums & Bubs model of care as well as the pilot of the model of care with AHWs.

9.2 Citation: Paper 5

Kong A, Dickson M, Ramjan L, Sousa MS, Jones N, Srinivas R, Chao J, Goulding J, George A. Aboriginal Health Workers promoting oral health among Aboriginal and Torres Strait Islander Women during pregnancy: development and pilot testing of the Grinnin' Up Mums & Bubs program. International Journal of Environmental Research and Public Health. 2021;18(18):9576. doi: 10.3390/ijerph18189576

9.3 Aims: Paper 5

This study aimed to develop and pilot test the intervention, a culturally appropriate model of care with AHWs to promote oral health during pregnancy; the model of care was named Grinnin' Up Mums and Bubs. The objectives of this study were to:

1. Develop an evidence-based, culturally appropriate oral health model of care for pregnant women;
2. Pilot test the model of care with the AHWs to identify the acceptability and satisfaction of the model of care, any improvements in their oral health knowledge and confidence and future recommendations.

9.4 Conclusion: Paper 5

The Grinnin' Up Mums & Bubs model of care was developed to promote the capacity of AHWs to support oral health promotion among Aboriginal and Torres Strait Islander

clients. The pilot findings revealed that the AHWs believed that the components of the model of care, inclusive of the training, resources, and referral pathways, were useful and culturally appropriate. The results also suggested that the program enhanced the AHWs' oral health knowledge and confidence. More importantly, the pilot findings suggested that the ease of integration of the model of care into the AHWs' practice could enhance long-term sustainability. Being a pilot, there is the need for further evaluation of the model to determine long-term change in practice among the AHWs, and improvements in oral health practice and status of Aboriginal and Torres Strait Islander women during pregnancy. There is also the need for dental policy changes to ensure greater coverage and access to culturally safe and affordable dental services. As this study utilised PAR, future implementation in other settings would require a highly tailored approach that specifically adapts the oral health model to the needs of Aboriginal and Torres Strait Islander consumers and stakeholders.

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Article

Aboriginal Health Workers Promoting Oral Health among Aboriginal and Torres Strait Islander Women during Pregnancy: Development and Pilot Testing of the Grinnin' Up Mums & Bubs Program

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Abstract: Background: this study aimed to develop and pilot test the model of care, Grinnin' Up Mums & Bubs, to train Aboriginal Health Workers to promote oral health among Aboriginal and Torres Strait Islander pregnant women. Methods: Participatory Action Research was employed to develop the different components of the model (oral health promotion resources, training workshop, and a culturally safe referral pathway to dental services). The model was piloted (pre-post), using an embedded mixed-methods design, to determine the acceptability, satisfaction, and any recommendations made by seven Aboriginal Health Workers at an antenatal service in Western Sydney, Australia. Results: there was a high level of satisfaction with the components of the model of care among the participants, who believed that the model could be integrated into practice. The training showed some improvement in oral health knowledge and confidence. The participants recommended strategies for discussing oral health with Aboriginal and Torres Strait Islander pregnant women, and changes in public health dental policy to ensure that all women would be able to access affordable dental services through the referral pathway. Conclusion: the findings suggest a high level of satisfaction with the model of care among the Aboriginal Health Workers. Further evaluation is needed to confirm the short and long-term impact of the model.

Keywords: Aboriginal and Torres Strait Islander; pregnancy; oral health; model of care; health promotion; training; participatory action research

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1. Introduction

Maintaining good maternal oral health during pregnancy is important for both the mother and the child [1]. Children are more likely to have poorer oral health across the lifespan if the mother also has poor oral health [2,3]. A lack of timely oral health education for mothers may also contribute to oral health or feeding behaviours in children that precipitate dental decay during early childhood [2]. In addition, there is a link between poor maternal oral health during pregnancy and an increased risk of adverse birth outcomes, such as low birth weight or pre-term birth [4]. However, as women have numerous other priorities during pregnancy, oral health tends to be overlooked even in countries with robust healthcare systems, such as Australia. One study found that only about a third of pregnant women living in Western Sydney accessed the dentist in the last six months [5]. Some reasons for the low uptake of dental services among expectant mothers included cost, misconceptions about oral health, and concerns about the safety of dental treatment during pregnancy [5]. Among Indigenous pregnant women globally, further barriers to accessing dental services include a lack of cultural safety, experiences of racism or discrimination, dental-related fears, low self-efficacy, or ineligibility to access public dental services [6].

Australian Indigenous peoples are respectfully known as Aboriginal and Torres Strait Islander peoples, and are acknowledged as the First Peoples and custodians of Australia. Due to a complex interaction of historical, economic, social, cultural, and environmental factors, Aboriginal and Torres Strait Islander Australians experience a greater burden of poor health and disease across their lifespan compared to other Australians [7]. Among Aboriginal and Torres Strait Islander pregnant women, poor oral health can contribute to ongoing economic and health inequalities [8]. Social, political, historical, and economic structural factors can restrict certain oral health behaviours, such as visiting the dentist, for some Australian Aboriginal and Torres Strait Islander pregnant women [6,9,10]. One example of these barriers includes obtaining a Confirmation of Aboriginality, a document issued by an Aboriginal community-controlled organisation that recognises an individual as being Aboriginal and Torres Strait Islander by a community in which the family is known or come from [11]. However, due to past Australian assimilation policies, many Aboriginal and Torres Strait Islander children were removed from their families and respective communities [12]. Such policies have contributed to the complexity in acquiring Confirmation of Aboriginality for many Aboriginal and Torres Strait Islander women. In some instances, individuals may also be able to obtain a Confirmation of Aboriginality where members of their family were born, through family records, or where people recognise the individual as Aboriginal and Torres Strait Islander [11,13–15]. Depending on the context, these certificates can support access to culturally safe and affordable services [11] such as dental care at Aboriginal community-controlled health services (ACCHSs) [10]. Other barriers to accessing dental services also include a lack of information and cultural safety among dental services [9,10]. There is a need to capacity build the broader antenatal health workforce and develop health services that provide culturally safe and engaged oral health promotion and support certain oral health behaviours such as accessing the dentist. Previous studies have identified the potential role and need for capacity building of Aboriginal health staff, such as Aboriginal Health Workers and Family Partnership Workers, to promote oral health care among Aboriginal and Torres Strait Islander pregnant women [10,16].

To improve maternal oral health in Australia, the Midwifery Initiated Oral Health (MIOH) model of care was developed to build the capacity of midwives to promote oral healthcare during antenatal appointments, undertake risk assessments and to provide timely dental referrals [17]. The MIOH intervention was found to be effective in increasing the knowledge and confidence of midwives to promote oral health as well as improving maternal oral health and the uptake of dental services during pregnancy [18]. The intervention was also widely acceptable and feasible for all stakeholders [19,20], effective in increasing the uptake to dental services during pregnancy, improved the maternal oral health of pregnant women [17], and was cost effective for health services [21]. The World

Health Organization has recently included the MIOH model in their 2021 implementation guidance document as a case study to showcase integration of oral health into primary health care [22]. Although the MIOH model of care was designed to promote oral health care among Australian pregnant women, it was not designed to be culturally specific or relevant for Aboriginal and Torres Strait Islander women. The resources and training for the MIOH model of care were developed without any Aboriginal and Torres Strait Islander community input or engagement, nor involved Aboriginal maternal health staff in the development or delivery of the model. Further, the MIOH training program is widely used by midwives who provide services in mainstream services. However, some Aboriginal and Torres Strait Islander women may choose to access non-mainstream antenatal services for more culturally appropriate care and may subsequently miss out on receiving the MIOH model of care [23]. To create a culturally safe model of care, a more collaborative approach to designing, pilot testing, and implementing the MIOH model needed to be undertaken.

Previous research informed aspects of the MIOH intervention that needed reviewing to promote oral health among Aboriginal and Torres Strait Islander pregnant women and better meet their needs [6,9,10,16]. The aim of this study was to develop and pilot test the intervention, a culturally appropriate model of care with Aboriginal Health Workers to promote oral health during pregnancy; the model of care was named Grinnin' Up Mums & Bubs. The objectives of this study were to:

1. Develop an evidence-based, culturally appropriate oral health model of care for pregnant women;
2. Pilot test the model of care with the Aboriginal Health Workers to identify the acceptability and satisfaction of the model of care, any improvements in their oral health knowledge and confidence, and future recommendations.

2. Materials and Methods

2.1. Methodological Approach

This study used Participatory Action Research (PAR) to develop and pilot test the Grinnin' Up Mums & Bubs model of care. PAR utilises a collaborative approach to define and develop solutions to challenges that hold significance for the participants and community involved in the research [24,25]. PAR challenges the traditional position of researchers and emphasises a shift in roles so that Aboriginal and Torres Strait Islander community members are supported by the research team, ensuring that the research aims, priorities, actions, and outcomes are relevant and reflect the needs of the community [24]. This process situates power with those most affected and encourages self-determination [24].

A PAR framework was adapted from the work of Kovach [26]. This framework involved three iterative phases: Phase (1) Preparation; Phase (2) Knowledge making; and Phase (3) Giving (Figure 1). As with an action research methodology, this was a cyclical rather than a linear process. Preparation (Phase 1) involved developing relationships with the Aboriginal health staff (who were both researchers and participants in the study), identifying the need for the research, conducting and publishing literature reviews [6,16], and obtaining ethical approval. Knowledge making (Phase 2) involved gathering and understanding the knowledge learned through focus groups with Aboriginal health staff [10] and interviews with Aboriginal women [9] to discuss needs and promoting oral health during pregnancy. The knowledge learned from Phases 1 and 2 informed Phase 3, this present study, which aims to give back through the development and piloted testing of a model of care with the Aboriginal Health Workers.

2.2. Design

The pilot in this study was evaluated using a mixed-methods concurrent embedded design. This model was piloted with the Aboriginal Health Workers using a qualitative approach, supplemented by quantitative data. In this embedded mixed-methods design, the qualitative component provided valuable and insightful feedback on the acceptability and feasibility of the model as well as recommendations for the next cycle of PAR. The

minor quantitative component aimed to complement the qualitative pilot and determine whether there was an improvement in knowledge and confidence in promoting oral health among the Aboriginal Health Workers, and to measure the satisfaction with specific aspects of the model of care.

Figure 1. Participatory Action Research framework to guide Phases 1–3.

2.3. Study Context

The need for improved oral health among Aboriginal and Torres Strait Islander pregnant women within the community was identified by Aboriginal health staff (including both Aboriginal Health Workers, Family Partnership Workers, and Aboriginal management staff) who worked in Greater Western Sydney, New South Wales (NSW), Australia, prior to the study. As part of Phase 1, the lead author (AK), a non-Indigenous woman, yarned with the Aboriginal health staff about how the Aboriginal Health Workers could drive the research. Yarning is a way of conversing to exchange Aboriginal and Torres Strait knowledge, ideas, experiences, and stories, and is also used to build trust and respect [27]. Since PAR involves community members who both drive the research and participate in the research, it requires a long-term commitment. In this study, a small group of Aboriginal health staff were closely involved in the research from the development stages to the implementation and pilot of the workshop, a period of three years. Although the group of Aboriginal health staff who were part of the study was small, the close and long-term partnership fostered a rich exploration of the needs and recommendations for developing a culturally safe oral health model of care.

2.4. Ethical Considerations

Ethical approval was obtained from the South Western Sydney Local Health District (2019/ETH09963), the Aboriginal Health & Medical Research Council (1438/18) and the Western Sydney University (RH13086) human research ethics committees. Written, in-

formed consent was obtained from all Aboriginal Health Workers who participated in the pilot study.

2.5. Developing the Grinnin' Up Mums & Bubs Model of Care

As part of the planning for the model of care (Phase 1), literature reviews were initially carried out [6,16] to identify current gaps in this area and whether other models of care or programs had been developed. The Aboriginal health staff also suggested that focus groups with other Aboriginal health staff [10], and interviews with Aboriginal and Torres Strait Islander pregnant women and mothers of Aboriginal and Torres Strait Islander children [9], would inform ideas for the model of care. These ideas included developing a suite of oral health promotion resources, a training workbook and a training workshop, and implementation of a culturally safe priority referral pathway to the dental service reinforced through the resources and training.

2.5.1. Oral Health Promotion Resources

An Aboriginal graphic designer needed to be employed to create the artwork for the resources. The Aboriginal health staff identified that the graphic designer should be a woman (as pregnancy was seen as women's business) and reside locally. The graphic designer who was employed to design the art was identified through Supply Nation, a national directory for verified Aboriginal and Torres Strait Islander businesses in Australia.

The specific resources that would be developed to assist with oral health promotion among clients, including ideas for illustrations, content, colours, and designs, were identified and also workshopped collaboratively by the Aboriginal health staff, the graphic designer, and AK. The resources that were considered to be most useful included a brochure, a fridge magnet, and a whiteboard educational tool that could be used by Aboriginal Health Workers as they worked with Aboriginal and Torres Strait Islander pregnant women and mothers on oral health.

The initial designs for the resources were stepped through an extensive consultation process that sought input, ideas, and feedback from the Aboriginal Action Group, Aboriginal and Torres Strait Islander pregnant women, and mothers and dental and nursing staff employed at ACCHSs across metropolitan and rural NSW. This process resulted in important changes to the resources, including changes to the layout, graphics, the language used, and modifications to the key health messages contained in the resources.

Three key messages were used across the resources to promote oral health during pregnancy:

1. Tooth and gum problems are more likely during pregnancy;
2. Your oral health can affect your baby;
3. Dental treatment is important and safe during pregnancy.

The brochure, whiteboard educational tool and training workbook included a self-administered screening tool, and all resources included options to access the dental service. The validated screening tool has a 94% sensitivity in detecting oral health problems among pregnant women [28]. The brochure and two fridge magnets were designed to be given to clients of the Aboriginal Health Workers, after yarning about the importance of oral health during pregnancy. The brochure contained detailed key messages whereas the fridge magnets included a simple call-to-action message. The double-sided whiteboard adapted the screening tool so that clients could interact with the resource using magnets. Images of these resources can be located at Supplementary File S1.

2.5.2. Training Program and Workbook

The format, content, and delivery method of the training program were informed through earlier research with the Aboriginal Health Workers [10] and the MIOH training program [18]. The training was also shaped through consultation with Aboriginal and Torres Strait Islander researchers (MD, JG, NWB, JA) as well as non-Indigenous researchers (AK, AG, LR, MSS). A training workbook, which summarised the information delivered,

was also produced as a point of reference for Aboriginal Health Workers to use after they had completed the training workshop.

2.5.3. Referral Pathway

Identifying culturally safe and accessible dental service options was a key area of discussion in the earlier phases of the study. The referral pathways implemented were designed to be specific to the community where the study was conducted. There were three main pathways where Aboriginal and Torres Strait Islander pregnant women could access dental services: public dental clinics, ACCHSs, and private dental services. The training provided the Aboriginal Health Workers with information about the different pathways and eligibility requirements of each pathway (see Figure 2).

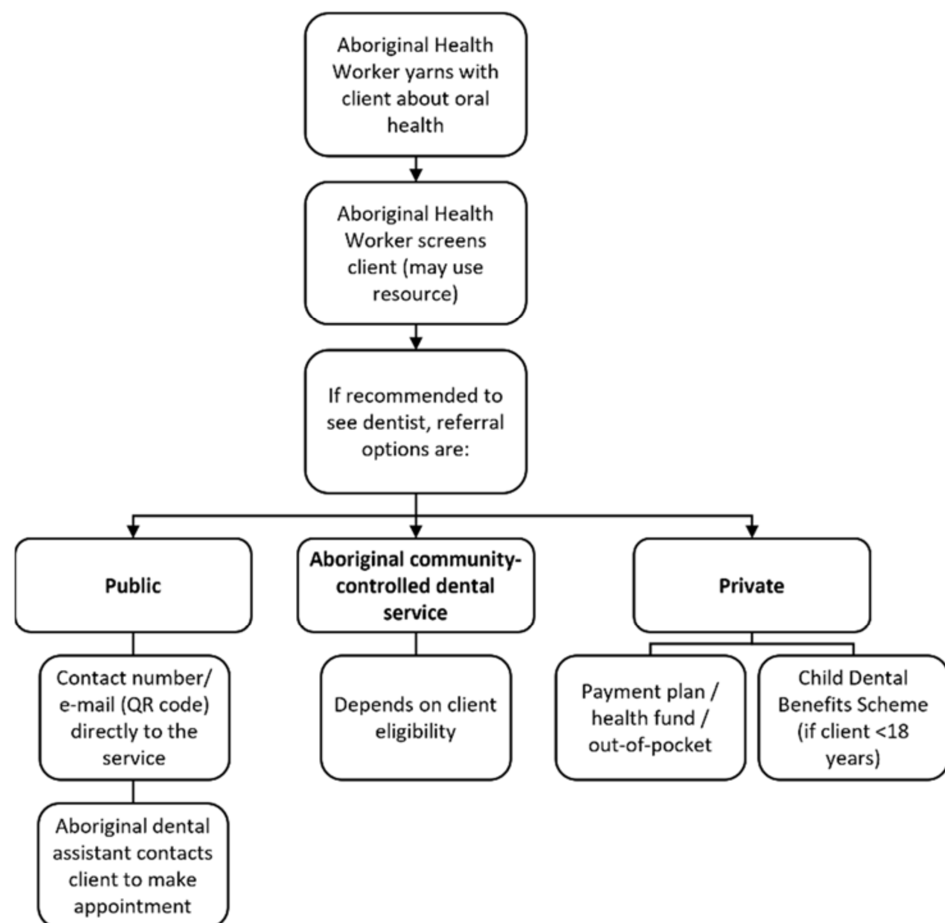

Figure 2. Dental referral pathways for the Grinnin' Up Mums & Bubs model of care.

As this study was conducted in collaboration with a NSW public health service, a strategy to improve cultural safety to access public dental services within public health policy was discussed. According to the existing NSW Health policy, pregnant women who want to book an appointment at a public dental clinic need to telephone a call centre where they are triaged by administration staff to determine eligibility and how soon an appointment needs to be made [29]. The policy stipulates that pregnant woman should not wait more than three months. To improve cultural safety of the local public oral health service, the process for booking dental appointments was adjusted. Either the client (or Aboriginal Health Worker on behalf of the client) could call or e-mail the service directly to leave a name and number. A QR code was also introduced on the fridge magnets so that clients could scan and send an e-mail directly to the dental service to book an appointment. An Aboriginal dental assistant would then call the client back to book an appointment based on whether the client was eligible and the urgency of the client's oral health needs.

2.6. Piloting the Model of Care with Aboriginal Health Workers

2.6.1. Demographics

A total of seven Aboriginal Health Workers participated in the training course and completed the pre-post surveys. The Aboriginal Health Workers were employed by a government public health organisation. Two sites in Greater Western Sydney were originally involved; however, due to the impact of the Coronavirus 2019 (COVID-19) pandemic, the other study site could not participate in the piloting of the intervention. The age of the participants ranged from 26 to 47 years. The highest level of education attained by four of the Aboriginal Health Workers was a certificate or diploma achieved from a vocational education training provider. The other three participants had, or were currently studying towards, a bachelor's or post-graduate degree. The years of experience working as an Aboriginal Health Worker ranged between seven months to 12 years. Four participants identified as receiving previous education or training regarding oral health care for pregnant women at work in-services.

2.6.2. Recruitment and Data Collection

The Aboriginal Health Workers who participated in the earlier focus groups [10] or were employed at the antenatal service in Western Sydney were invited through e-mail to participate in the study. Recruitment flyers and the participant information sheet were shared with the Aboriginal Health Workers. The Aboriginal Health Workers were given participant information sheets (both online and as a hard copy), which was also verbally discussed with the lead author before providing written consent.

The model of care was piloted with the Aboriginal Health Workers through a pre–post test design. Piloting of the model consisted of delivery of the training workshop and feedback on the resources as well as feedback on the referral pathway using a pre-post questionnaire.

2.6.3. Pre–Post Questionnaire

The pre–post pilot questionnaire (Supplementary File S2) collected qualitative and quantitative data about the training workshop, the oral health promotion resources, and the referral pathway. The baseline pre-questionnaire used questions about antenatal oral health knowledge (Section 1) and confidence (Section 2), in addition to demographic questions. The participants could respond to the knowledge questions by selecting "True", "False" or "Don't know". The confidence questions used a numerical (1–5) Likert Scale ranging from "Not confident at all" (1) to "Completely Confident" (5). The post-training questionnaire included the same knowledge and confidence questions, but also included a feedback component (Section 3) where participants could provide feedback on the relevance, usefulness, and cultural appropriateness of the different components of the model of care. The feedback in Section 3 was provided through a numerical (1–5) Likert Scale ranging from "Strongly disagree" (1) to "Strongly agree" (5) in response to the various statements. In addition, Section 3 included three open-ended questions that were asked at the end of the post-questionnaire:

1. What did you like about the training/model of care?
2. What did you not like about the training/model of care?
3. Do you have any recommendations to improve the training/model of care?

The knowledge and confidence component of the pilot questionnaire was developed from the literature [1,30,31], and included some knowledge and confidence questions used in the MIOH training program for midwives [18], the focus groups with the Aboriginal health staff [10], and from current health policies [29,32]. The questionnaire was piloted with a group of Australian Aboriginal and non-Indigenous academics and researchers, a researcher who previously worked as an Aboriginal Health Worker, and a biostatistician, and changes were made accordingly to ensure readability and cultural appropriateness.

2.6.4. Training Workshop

The training program consisted of a face-to-face workshop delivered by Aboriginal researchers (NWB, JA), a researcher with a dental background (AG), and the lead author (AK). Three training workshops were delivered due to the conflicting schedules of the Aboriginal Health Workers. Depending on the size of the workshop, they were between one to two hours and included a PowerPoint presentation and group discussions. The content comprised of a theoretical component followed by a practical component. The theory included basic tooth and gum anatomy; the relationship between oral health and pregnancy; common problems; guidelines; safety of dental treatment, and good oral health practices. The practical component included a discussion about the need to yarn, screen and refer clients (where appropriate) to the dental service. This component also consisted of discussions about how the oral health promotional resources could be used in the Aboriginal Health Workers' practice, as well as the appropriate referral pathways and eligibility requirements.

The pre-questionnaire was administered to the Aboriginal Health Workers prior to the training workshops. After the training workshops were delivered to the Aboriginal Health Workers, the follow up post-questionnaire was administered in person. The Aboriginal Health Workers were provided the opportunity by the workshop facilitators to elaborate on the three open ended questions verbally after completing the written questionnaire. All participants consented to have the verbal feedback recorded. The verbal discussions of the three open-ended questions lasted between six and twenty minutes.

2.7. Analysis

2.7.1. Qualitative

The qualitative data were transcribed through an external professional transcription service, specialising in academic transcription services. The written qualitative feedback was also included. A conventional content analysis approach, as described by Hsieh and Shannon [33], was used to analyse the data as the participants provided both verbal and written feedback in response to three specific, open-ended questions. As part of the first step, AK read and re-read the transcripts for immersion and inductive category development. AK then highlighted exact words or phrases spoken by the participants that captured key concepts; AK exported these as quotes onto an Excel spreadsheet, and separated the quotes based on which open-ended question they addressed. The quotes were then coded, labelled and categorised based on the ideas shared, which were reviewed by LR for accuracy. AK developed the coding structure by grouping similar codes together to construct meaningful sub-categories. These sub-categories were reviewed and refined together with LR to create broader categories, which were labelled and defined. The codes were then reviewed against the categories. The categories and their definitions were further refined by AK and LR. AK selected specific examples from each category to support the reporting of the data.

2.7.2. Quantitative

Descriptive statistics were used to analyse the quantitative data. To measure the change in oral health knowledge, the pre- and post-questionnaire mean scores for each question were calculated separately and compared. The oral health knowledge score for each question was based on the mean number of correct responses across the group. Changes in oral health confidence, for each question, were measured by calculating the mean scores for both the pre- and post-questionnaires. The scores for the agreement statements in the post-questionnaire feedback, with the various components of the model of care, were calculated as an average out of 5.00. Overall agreement was observed if the score was greater than 4.00 (>80%). The data were analysed using SPSS Statistics for Windows, Version 25 (IBM Corp, Armonk, NY, USA). See Supplementary File S2 for additional details of the quantitative data. In keeping with the mixed-methods concurrent

embedded design, the descriptive statistics were integrated into the relevant categories and sub-categories to complement the qualitative data.

3. Results

There were three categories that reflected the pilot feedback from participants (Table 1).

Table 1. Categories and sub-categories.

Categories	Sub-Categories
Satisfaction with the model of care	• Satisfaction with the training: "it built on my existing oral health knowledge" • Satisfaction with the resources: "it's a great visual prompt" • Satisfaction with the referral pathway: "it's a more culturally appropriate pathway"
Integration of the model in practice	• Applying new knowledge in practice: "that information I can then put into practice" • Renewed confidence to discuss oral health: "I feel more confident to answer questions"
Recommendations	• Getting the message out there: "we've got to be flexible and meet the client's needs" • The need for policy reform: "they're not eligible for the Health Care Card" • Opportunities to widen reach: "I just want everyone to know about it"

3.1. Satisfaction with the Model of Care

The participants provided positive feedback on the model of care, and described the components that were useful, relevant, and appropriate.

3.1.1. Satisfaction with the Training: "It Built on My Existing Oral Health Knowledge"

The Aboriginal Health Workers discussed the content of the training, and specifically about how its content was relevant, coherent, and built on the Aboriginal Health Workers' existing knowledge.

> *I think it's [training] really great. Honestly, the information that you've given us isn't mind blowing. So it's not like overly technical or anything. It's just like, oh damn, I didn't know that which is really good, so it's easy to understand.* (Isobelle)

Some Aboriginal Health Workers also provided feedback on the delivery of the training, stating that *"I think it was well-explained"* (Rachel), *"Clear and to the point"* (Anonymous written feedback), and that "*The information was precise and didn't waffle on"* (Rebecca).

The data from the post-training questionnaire identified that all Aboriginal Health Workers strongly agreed that the content of the training was easy to understand, the length of the training was adequate, relevant to their work, and provided knowledge to use when giving oral health advice to clients (Table 2). All Aboriginal Health Workers were satisfied with the quality of the presenters (100%) and PowerPoint presentation (97%) and found it to be culturally appropriate (97%).

Table 2. Likert agreement to post-training feedback statements.

Feedback Statements *	Mean Score (%)
The content was easy to understand	5.00 (100)
The material was relevant to my work	5.00 (100)
The training has given me knowledge to use when I give oral health advice	5.00 (100)
The screening tool is easy to use	5.00 (100)
The referral pathways would be appropriate to use	4.86 (97)
The length of the training was adequate	5.00 (100)
The training met the learning objectives	5.00 (100)
I would recommend this training to other Aboriginal Health Workers	5.00 (100)
I am satisfied with the quality of the presenters	5.00 (100)
I am satisfied with the quality of the PowerPoint	4.86 (97)
I am satisfied with the quality of the training manual	5.00 (100)
I am satisfied with the quality of the screening tool	5.00 (100)
I am satisfied with the quality of the supporting oral health resources (brochure, whiteboard resource, magnet)	5.00 (100)
The training presentation was culturally appropriate	4.86 (97)
The training manual was culturally appropriate	5.00 (100)
The screening tool was culturally appropriate	5.00 (100)
The referral pathways were culturally appropriate	4.86 (97)
The supporting oral health resources (brochure, whiteboard resource, magnet) was culturally appropriate	5.00 (100)

* Statements rated using a numerical (1–5) Likert scale where 1 = strongly disagree and 5 = strongly agree.

3.1.2. Satisfaction with the Resources: "It's a Great Visual Prompt"

The participants also reflected on the visual appeal and usefulness of the oral health promotion resources, including the brochure, fridge magnets, the screening tool and the use of a QR code on the resources to make dental referrals. The resources, particularly the brochure, were described as beautiful, bright, colourful, practical, and user-friendly.

> *I think the resources are beautiful. They're nice and bright and user friendly and you don't feel shame looking at them. You enjoy looking at them.* (Isobelle)

> *I find the QR and with that e-mail [on the fridge magnet]—how it's literally, pretty much all done, and all you've got to do is add your details—name and [number]—so I thought that's pretty good.* (Rachel)c

> *Appropriate as well as culturally, love the resources.* (Anonymous written feedback)

The data also corroborated with the Aboriginal Health Workers' comments about the supporting oral health promotion resources. The post-training questionnaire found that all participants were satisfied with the quality of the resources, and strongly agreed that the oral health promotion resources were culturally appropriate (Table 2).

3.1.3. Satisfaction with the Referral Pathway: "It's a more Culturally Appropriate Pathway"

All participants agreed that the referral pathways were culturally appropriate (100%) and would be appropriate to use for their clients (97%) (Table 2). The referral pathways to dental services were described as being clear for the Aboriginal Health Workers to use, and that the screening tool supported practice. The comment made by Rebecca was reflected in all the Aboriginal Health Workers' feedback questionnaires:

> *There are also ways to—clear referral pathways for us Health Workers to be able to refer to support information and delivery. And a clear screening tool. So walking with them a little more than just you know—giving them the information and that it's recommended. When you're using the screening tool it's more of a prompt: "Let's focus on this today."* (Rebecca)

3.2. Integration of the Model in Practice

The Aboriginal Health Workers considered how the components of the model of care, particularly the training, could be applied in practice and could inform or facilitate change due to an increase in knowledge and confidence levels.

3.2.1. Applying New Knowledge in Practice: "That Information I can then Put into Practice"

Some Aboriginal Health Workers, such as Mia, reflected on how the training had built on their existing knowledge about oral health and pregnancy.

> *The information that you've provided me today in regards to the health risks of pregnant women—it's given me reminders about the whole concept of the links between oral health and pregnancy.* (Mia)

The above comment was evident in the pre–post quantitative data on oral health knowledge. All Aboriginal Health Workers demonstrated an increase in oral health knowledge score. Pre and post scores for each item have been outlined in Table 3. The greatest improvements in knowledge observed were on oral health changes and misconceptions during pregnancy (average 50% improvement). There were also improvements in knowledge about accessing public dental services (39.3%), specific dental treatments that are safe during pregnancy (25.7%), and the link between gum disease and pregnancy outcomes (23.8%).

Table 3. Change in oral health knowledge pre–post training.

Section	Knowledge Question	Knowledge Scores		
		Baseline (%)	Post (%)	Change Pre-Post (%)
Section 1: Oral health changes and misconceptions during pregnancy	K1. Pregnant women are at more risk of getting oral health problems compared to other women	4 (57.1)	6 (85.7)	29% *
	K2. Gums can become red and swollen during pregnancy	5 (71.4)	6 (85.7)	14%
	K3. Women should brush teeth after vomiting to avoid wearing down teeth	2 (28.6)	7 (100)	71% *
	K4. The baby draws calcium out of the mother's teeth during pregnancy	1 (14.3)	7 (100)	86% *
Section 2: Link between maternal oral health and pregnancy outcomes	K5. Severe gum disease has been linked to: late delivery of babies	3 (42.9)	5 (71.4)	29% *
	K6. Severe gum disease has been linked to: low birth weight of babies	2 (28.6)	4 (57.1)	29% *
	K7. Severe gum disease has been linked to: pregnancy loss	2 (28.6)	3 (42.9)	14%
Section 4: Antenatal care guidelines and recommendations on the role of Aboriginal Health Workers	K8. Based on current pregnancy care guidelines, all antenatal care providers (including AHWs) should: give oral health advice to pregnant women	5 (71.4)	7 (100)	29% *
	K9. Based on current pregnancy care guidelines, all antenatal care providers (including AHWs) should: avoid asking pregnant women questions about potential dental problems	6 (85.7)	7 (100)	14%
	K10. Based on current pregnancy care guidelines, all antenatal care providers (including AHWs) should: avoid recommending women to see dental services	6 (85.7)	7 (100)	14%

Table 3. *Cont.*

Section	Knowledge Question	Knowledge Scores		
		Baseline (%)	Post (%)	Change Pre-Post (%)
Section 5: Accessing public dental services	K11. Based on current pregnancy care guidelines, all antenatal care providers (including AHWs) should: recommend that every child should see a dentist by the age of one	6 (85.7)	6 (85.7)	0%
	K12. Only adults with Health Care Cards/Pension Cards can access public dental services	5 (71.4)	7 (100)	29% *
	K13. Pregnant women, who are eligible to go to public dental services, will have to wait longer than 3 months for an appointment	1 (14.3)	7 (100)	86% *
	K14. Not all children (under 18 years) can access public dental services	4 (57.1)	7 (100)	43% *
	K15. Some children can receive the Child Benefits Schedule (AUD 1000) from Medicare to go to a private dentist	6 (85.7)	6 (85.7)	0%
Section 6: Safety of specific dental treatments during pregnancy	K16. All antibiotics are safe during pregnancy	2 (28.6)	4 (57.1)	29% *
	K17. All pain relief medicines are safe during pregnancy	4 (57.1)	4 (57.1)	0%
	K18. Most dental treatments are safe during pregnancy	4 (57.1)	6 (85.7)	29% *
	K19. Dental X-rays are safe during pregnancy	3 (42.9)	5 (71.4)	29% *
	K20. Local anaesthesia (numbing injections) are safe during pregnancy	2 (28.6)	5 (71.4)	43% *
Section 7: Early childhood oral health practices	K21. Putting a baby to bed with a bottle increases the baby's risk of dental decay	7 (100)	7 (100)	0%
	K22. Adding fruit juice to the baby's bottle will not increase the baby's risk of dental decay as long as there are "no added sugars"	6 (85.7)	7 (100)	14%
	K23. Adding honey (or another sugar sweetener) to the baby's dummy will not increase the baby's risk of dental decay	6 (85.7)	6 (85.7)	0%
	K24. Sharing a spoon with the baby will not increase the baby's risk of dental decay	5 (71.4)	7 (100)	29% *

* >25% improvement in knowledge.

Many Aboriginal Health Workers went on to relate specific examples where this knowledge could be integrated into their practice. Some described they would change the way that they screened and referred clients to dental services following the training.

> *Before I just recommending that everybody see the dentist but obviously now I know that if somebody says 'yes' to any of those things [oral health problems] then you obviously have to be a bit more—you have to make that appointment [because] they might be at risk?* (Rebecca)

3.2.2. Renewed Confidence to Discuss Oral Health: "I Feel more Confident to Answer Questions"

Some participants described feeling more confident to discuss oral health with clients following the training. The Aboriginal Health Workers spoke about how they felt more confident to answer oral health-related questions with clients and reflected that confidence would also be fostered over time with experience.

I feel more confident to answer questions from now, whereas previously I suppose when it has arisen and they've asked me things that I didn't know I've been honest with them and said, I don't know but let me find out for you. (Kim)

But I think it [resources] will be easy to use, easy to talk about as we get more comfortable talking about it [oral health] as well. (Isobelle)

Some participants, such as Samantha and Kim, remarked on how using the resources would help with confidence in discussing oral health as well as taking a systematic approach to giving advice to clients:

I like how the pamphlet has got that section here where you can ask about what exactly if they're experiencing any of those . . . it helps me to not feel worried about forgetting asking something because it's in there anyway. So you just cover all your bases. (Samantha)

I think with these resources I feel more confident discussing it. (Kim)

The pre-post quantitative findings found that all Aboriginal Health Workers were confident to discuss good oral health care with pregnant women, which improved by 17% (Table 4). Following the training, the post-questionnaire found that all participants were confident to ask screening questions to identify if a client needed to see the dentist (20% improvement). All Aboriginal Health Workers were completely confident to refer clients at risk of poor oral health to the dentist (11% improvement).

Table 4. Change in oral health confidence pre-post training.

Confidence Statement	Knowledge Scores		
	Baseline (%)	Post (%)	Change Pre-Post (%)
1. How confident are you in discussing good oral health care with a woman during her pregnancy?	3.57 (71)	4.43 (89)	17%
2. How confident are you in asking screening questions to identify if a pregnant woman needs to see the dentist?	3.86 (77)	4.86 (97)	20%
3. How confident are you in referring clients at risk of poor oral health to dental services?	4.43 (89)	5 (100)	11%

3.3. Further Recommendations

There were no aspects of the model of care that the Aboriginal Health Workers disliked. However, several recommendations around future practice, policy, and the scope to upscale the model were identified. The participants also made some recommendations on how to discuss oral health with clients, particularly if it was seen as a sensitive topic for the client.

3.3.1. Getting the Message out There: "We've Got to be Flexible and Meet the Client's Needs"

Several strategies were recommended by the Aboriginal Health Workers to mitigate the sense of confrontation associated with yarning about oral health. Some reflected on experiences where non-Indigenous nursing and midwifery staff *"aren't always culturally appropriate"*. (Isobelle)

Because I've had midwives - and the client has just swore and whatever at them because how they've come out and said it and pretty much was pretty abrupt and said, you need to book yourself into the dentist because your teeth are very poor and that's going to do harm to your baby. (Rachel)

The need for flexibility in how and when oral health promotion is delivered was discussed by a few Aboriginal Health Workers. The importance of building rapport was stressed, which meant that there needed to be flexibility when initiating a conversation about oral health.

> *You build up that rapport and you know that's going to be an okay conversation to have with someone. we've got to be flexible in our approach and meet the client's needs where they're at, and it might not be until the fifth or sixth visit.* (Isobelle)

One of the strategies, suggested by a few Aboriginal Health Workers like Kim, was to take an indirect approach by firstly discussing the oral health needs of the children or family before asking the client.

> *So sometimes I've had to bypass that and go other ways and talk about the kids that are already in the house with their dental and break it down like that.* (Kim)

Using the oral health promotion resources to facilitate the conversation was also advised by a few participants. Some suggested that the whiteboard educational tool could be given to a client before an appointment to initiate a conversation about oral health:

> *I think for me it would be like if a mum is sitting out in the waiting room at the clinic you can just give it [whiteboard educational tool] to her to have a look at and then when she comes in we can talk about it as well. So it's not too confrontational as well. She can already be thinking about some of those things before we talk.* (Isobelle)

Mia explained that the existing oral health promotion resources needed to be complemented with oral health products *"Otherwise I think you end up just coming across a bit preachy"*:

> *Health promotion from my experience is well delivered when it comes to the brochure and the paper source but you need to have something to back it up as a produce. So I believe a toothbrush and toothpaste pack already set up that when we give that information we hand that as well.* (Mia)

3.3.2. The Need for Policy Reform: "They're Not Eligible for the Health Care Card"

One of the main recommendations made by the Aboriginal Health Workers focused on the gap in policy for some clients when referring to dental services. Some described the difficulty of accessing dental services through current referral pathways for some clients, particularly if the client did not meet the criteria for public or Aboriginal community-controlled dental services. The participants discussed that even though some clients had partners who had full-time work, dental treatment provided by private clinics would place financial stress on the family.

> *With regards to the referral pathway it is a concern for adults from 18 and up who don't have a Health Care Card because there are some families that the partner is working full-time, so therefore they're not eligible for the health care card or pension card so where do they go from that because does it matter if you've got a full-time worker partner? Sometimes budget and finances are very tight, and that is a barrier that's going to prevent an adult person to access a dentist if they can't afford it. we do have our other referral pathways, like the Aboriginal. But then again, that's a barrier for the Aboriginality [papers] as well and not all of our families will have that.* (Mia)

While the Aboriginal Health Workers acknowledged that although the referral pathway implemented as part of the model of care was more culturally appropriate, there was still a clear gap for women who were not eligible:

> *I guess it's [referral pathway] a more culturally appropriate pathway. I'm still concerned that parents or mothers who don't have access to concession cards won't get free dental. I think everyone should get free dental.* (Isobelle)

3.3.3. Opportunities to Widen Reach: "I Just Want Everyone to Know About It"

When discussing the recommendations for the model of care, the Aboriginal Health Workers also identified the need to implement the model in other settings. The Aboriginal Health Workers described a couple of instances where the first point of contact for many Aboriginal and Torres Strait Islander women was in the hospital or through another service.

I think Aboriginal health workers just even with other services, they do come across pregnant women. Sometimes they get them before we even do. (Kim)

The hospital clinic definitely does [see pregnant women earlier] because that's where all the referrals are coming from. (Isobelle)

The Aboriginal Health Workers spoke about how components of the model in other settings could complement their delivery of oral health promotion. Some comments identified that midwives providing a brochure at the initial antenatal visit could be helpful while other comments focused on the need to train the broader health workforce.

We could also include it [brochure] in the cultural packs. So that way it's still getting out there to those that don't come to the program—they're still going to get the information. (Rachel)

I just want everyone to know about it [model of care]. I want you to go in and tell the Aboriginal midwife, to share it with everyone so everyone is aware of it. They might not have access to an Aboriginal health worker either. They still should still have this information. (Isobelle)

For clients who lived rurally, a few Aboriginal Health Workers in one workshop identified that Aboriginal health practitioners could play a role if oral health training was integrated into the curriculum. Kim, who had an Aboriginal Health Practitioner qualification, reflected on this:

I think it's true that you have a lot of Aboriginal health practitioners that work rurally. So maybe it could be something that could be put in with the training of the Aboriginal health practitioner. Because oral health is part of it, but you don't touch on it. Nothing like this is for pregnant women. (Kim)

When asked about delivering the training in rural areas, Isobelle believed that it needed to be delivered face-to-face due to potential issues with internet connectivity.

It [internet connectivity] just drops out all the time. So it's not a good platform unless you've got a really good, secure network, and I'm not sure that they do. They [health workers in rural areas] might have out there, but they might not. But I would think—I prefer face-to-face. (Isobelle)

4. Discussion

This is the first time a culturally safe antenatal oral health model of care has been developed and piloted to train Aboriginal Health Workers to promote oral health among Aboriginal and Torres Strait Islander pregnant women worldwide [16]. This model of care included culturally appropriate resources, training, a screening tool, and a priority referral pathway. Although the impact of the COVID-19 pandemic limited the sample size, the findings revealed a high level of acceptability and satisfaction with the components of the model of care among the Aboriginal Health Workers, who also discussed how the model could be easily integrated into practice. These results were likely achieved because of the focus on PAR throughout this research [10], which was identified as a recommendation to create an oral health intervention among Aboriginal and Torres Strait Islander pregnant women in an earlier study [16]. As part of ethically conducted research across Canada and Australia, interventions that have involved capacity building Indigenous health staff in oral health undertake consultation and develop partnerships with key stakeholders and the community [34–37]. In this study, however, PAR was used purposefully so that Aboriginal Health Workers would be supported by the research team to direct the research and ensure that the actions and findings would meet the needs to promote oral health among Aboriginal and Torres Strait Islander pregnant women. PAR provided a framework where there was a high level of responsiveness to the needs of the Aboriginal Health Workers [16]. Using this approach is key to the translation of this model to other Aboriginal and Torres Strait Islander communities. PAR is also important to develop a sustainable model of oral healthcare for other pregnant women in communities where there may be an

unequal power dynamic with the research team, such as with culturally and linguistically diverse communities or with refugee populations.

The pilot findings from the training workshop found individual improvements in oral health knowledge across all the Aboriginal Health Workers. Although the sample size was too small to determine whether this improvement was significant, there were large improvements in knowledge in several areas. These areas included misconceptions about oral health during pregnancy, the link between oral health and general health, eligibility to access public dental services, the safety of dental treatment during pregnancy, and early childhood oral health practices. These areas of knowledge are crucial to giving knowledge about the importance and safety of dental care during pregnancy, as well as advice about how to access dental services. In the international literature, both Indigenous and non-Indigenous pregnant women have misconceptions about oral health during pregnancy [6,38–40]. One review exploring the attitudes of Indigenous pregnant women found that some women avoided public dental services due to the complexity in navigating the service and suggested that experiences of racism may contribute to poor dental attendance [6]. The determinants of dental care use during pregnancy are multifactorial, encompassing demographic, socioeconomic, behavioural and psychological factors [41]. One of the psychological factors in this framework by Rocha, Arima, Werneck, Moysés, and Baldani [41] includes receiving oral health education, which suggests that this training could translate into enhancing access to dental care among Aboriginal and Torres Strait Islander pregnant women.

The Aboriginal Health Workers also reported a high level of confidence in discussing oral health care, screening pregnant women at risk of oral health problems and referring clients to the dental services after the training. The study by Smith et al. [42] similarly found that most Aboriginal Health Workers were confident to deliver dental advice to families about early childhood oral health following a training course. As Aboriginal and Torres Strait Islander women may also access other antenatal care providers such as midwives, other studies have also shown that training can improve confidence of antenatal care providers to deliver oral health promotion [18,43]. However, further research would be needed to determine the confidence of non-Indigenous antenatal care providers to deliver culturally safe oral health care following training.

The pilot findings suggest that the Grinnin' Up Mums & Bubs training program provides Aboriginal Health Workers with the knowledge and confidence to promote oral health and undertake dental referrals for pregnant women. However, as identified in our findings, oral health can be a sensitive and challenging topic to discuss, particularly because poor oral health can be a source of shame and embarrassment for both non-Indigenous as well as Aboriginal and Torres Strait Islander peoples [10,44,45]. The Aboriginal Health Workers in this study discussed several strategies around initiating a conversation about oral health. The need to build rapport and trust has been identified in our earlier research [9,10]. However, this study highlights several other specific strategies including the need to be flexible, taking an indirect approach and using the oral health promotion resources to avoid a sense of shame, confrontation, and judgement. These strategies reflect a respectful and culturally safe practice where clients do not feel disempowered; rather, it enables Aboriginal and Torres Strait Islander women to engage in decision-making about their oral health during pregnancy [46].

The results from the Grinnin' Up Mums & Bubs pilot suggests that the model could be translated into practice to improve the oral health outcomes of Aboriginal and Torres Strait Islander pregnant women. However, there is the need for further short and long-term evaluation with a larger sample. Follow up evaluation would need to assess whether the high oral health knowledge and confidence levels are sustained, and whether there is the support in place to ensure actual and long-term change in practice among the Aboriginal Health Workers. In addition, research should explore whether the model leads to an increase in accessing dental services during pregnancy and improves the oral health status and knowledge among Aboriginal and Torres Strait Islander women. These follow-up

evaluations are important to measure to determine the long-term health and economic impact of the Grinnin' Up Mums & Bubs model of care. Previous evaluations of the efficacy and cost-effectiveness of the MIOH model of care have established that it can reduce dental treatment costs in the long term [21], although more research is needed to determine the long-term impact of the Grinnin' Up Mums & Bubs model.

In terms of long-term sustainability, particularly in the health service where the study was conducted, the existing antenatal service will need restructuring to integrate the Grinnin' Up Mums & Bubs model. This integration will facilitate ongoing training as well as printing of resources and use of the dental referral pathways created. Additional strategies such as adding recommendations for discussing oral health and designating an Aboriginal Health Worker or Aboriginal health staff member to provide the training to new staff could also be included.

There is also the need to consider the policy barriers that impact on the effectiveness of the model. One of the main concerns identified in the pilot was that not all the Aboriginal Health Workers' clients would be eligible to access the public dental services. Eligibility to access public dental services in NSW for adults are based on the client's residency and whether they have a valid concession card [32]. Concession cards are available only if individuals fall under a relatively lower income bracket [47] or have a partial capacity to work [48]. Our earlier research confirms that the requirement for a concession card is a barrier for some Aboriginal and Torres Strait Islander pregnant women who may not be able to comfortably afford a dental check-up or treatment [9,10]. The provision of a free dental check-up or treatment during pregnancy, regardless of Health Care Card status, would be particularly important for clients of Aboriginal Health Workers who provide home-visiting antenatal support services to Aboriginal and Torres Strait Islander women [49,50]. Although the referral pathway to the public dental service was designed to reduce the institutional barrier in booking appointments, alternative solutions would need to be explored in other settings depending on the availability of affordable services. Opportunities should be explored to develop partnerships with local ACCHSs to allow for better coverage for patients who may not be ordinarily eligible to access public dental care. Currently in NSW, there is no avenue for subsidised care as it exists in other jurisdictions like Victoria and South Australia, which allows for targeted delivery of programs for vulnerable populations. University dental training programs could explore providing ineligible pregnant women with the appropriate assessments and treatments, although students would need additional training to ensure that their practice is culturally safe. Even without access to dental services, however, oral health advice can still provide a protective effect to a pregnant woman's oral health. A recent study in Australia among pregnant women found that oral health knowledge delivered by midwives was effective in improving oral health even without a clear referral pathway in the short term [21]. As suggested in the findings, this advice could also be more effectively delivered among Aboriginal and Torres Strait Islander women if culturally appropriate oral health promotion resources are complemented with oral health products.

Lastly, it is important to consider the workload and time constraints experienced by Aboriginal Health Workers. A comprehensive review in Australia found that employee retention among Aboriginal Health Workers can be affected by stress due to the expectations and demands from both the workplace and community [51]. Thus, if there is staff turnover among the Aboriginal Health Workers, face-to-face workshops would need to be re-delivered to new staff. One approach that could increase dissemination of training may be to introduce an antenatal oral health module to the curricula of Aboriginal Health Workers as well as other health workers who deliver health care to Aboriginal and Torres Strait Islander pregnant women. As Aboriginal and Torres Strait Islander pregnant women may engage with different health care providers throughout the pregnancy, it is important that the broader antenatal health workforce are trained to promote oral health in ways that are culturally safe.

5. Conclusions

Grinnin' Up Mums & Bubs is the first model of care that has been developed and piloted to be culturally safe to capacity build Aboriginal Health Workers to promote oral health among Aboriginal and Torres Strait Islander pregnant women. The various components of the model, including the resources, training, and referral pathway, were useful, culturally appropriate, and built on the existing knowledge and confidence of the Aboriginal Health Workers. The pilot's findings also support a permanent integration of the model into the existing antenatal service. However, further evaluation is necessary to determine whether the model of care would be effective in changing practice among Aboriginal Health Workers and improving the oral health behaviours, practices and oral health status among Aboriginal and Torres Strait Islander pregnant women. The study also suggests the need for policy changes to ensure more Aboriginal and Torres Strait Islander women have access to affordable dental services during pregnancy as part of the model of care. Lastly, the study highlights that a one-size-fits-all solution would likely not be effective in promoting oral health among Aboriginal and Torres Strait Islander pregnant women. The PAR process in this study was essential to identifying needs as well as sustainable solutions for Aboriginal and Torres Strait Islander women in this community. For other populations in other settings, it is important that extensive engagement is undertaken to respond to the needs and voices of consumers, and to ensure program success and sustainability.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/ijerph18189576/s1. Images for the oral health promotion resources can be located in Supplmentary File S1. The pre- and post-training questionnaires can be located in Supplementary File S2.

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Chapter 10: Discussion

10.1 Overview

The main aim of this study was to develop and pilot a culturally appropriate model of care centred on promoting oral health among Aboriginal and Torres Strait Islander pregnant women by capacity building Aboriginal health staff. To inform the development of the model, the study gathered evidence on the current, global literature in this area; the oral health needs and perspectives of Aboriginal and Torres Strait Islander women during pregnancy; and the perspectives of Aboriginal health staff. The evidence generated in the first half of the study was foundational to the development of the Grinnin' Up Mums & Bubs model of care. To develop and pilot test the model of care, an embedded mixed-methods design was adopted. To support the PAR methodology, it was important that the mixed-methods design had a strong qualitative focus.

The purpose of this chapter is to summarise and integrate the findings relevant to the study's objectives and discuss them in light of any new literature that has been generated since the thesis publications. The first sections of this chapter will integrate the study's first four objectives to explore the oral health needs of Aboriginal and Torres Strait Islander women during pregnancy, and the perspectives of Aboriginal health staff to promote maternal oral health. The next section will discuss the development of the Grinnin' Up Mums & Bubs model of care, and the pilot findings in relation to existing antenatal oral health interventions globally and the oral health needs identified in the first section. A section on the impact of COVID-19 on the outcomes of the study will then be outlined. The last section will examine the conceptual framework, as well as the focus on community and stakeholder engagement, and reflect on whether the framework was effective in guiding the study. This chapter will conclude with the study's strengths and limitations.

10.2 The Oral Health Needs of Aboriginal and Torres Strait Islander Women During Pregnancy

The mixed-methods systematic review (Paper 1) gathered existing evidence on the oral health knowledge, attitudes and practices of Indigenous women globally to delineate oral health needs.[157] Findings highlighted a clear gap, as none of the studies conducted an in-depth, rich exploration of the contextual complexities that Aboriginal and Torres Strait Islander women experience, nor were any of the findings specific to NSW, which was the rationale for the paper exploring the oral health experiences and perspectives of Australian Aboriginal women (Paper 4).[167]

Since these publications, an update of the literature has revealed an additional seven studies across Australia, Canada, and the United States. Four of these studies[175-178] were linked to one intervention, the Baby Teeth Talk study, a transnational study spanning across Australia, Canada, and New Zealand (although no recent literature retrieved reported findings in New Zealand). Five studies were qualitative,[175, 178-181] with four consisting of interviews. The remaining two were cohort studies in Australia[176, 177] and referenced the Baby Teeth Talk study; some of the data contained in these studies have been reported in the mixed-methods systematic review (Paper 2). Of the other two qualitative studies in Australia, one briefly discussed the oral health perspectives of Aboriginal and Torres Strait Islander women during pregnancy,[179] and the other mainly focused on the early childhood period.[178]

The concerns and experiences of Indigenous women in the review (Paper 1), and Aboriginal women who participated in the qualitative study (Paper 4), show that competing priorities and responsibilities to family and community meant that less focus, time and resources could be allocated to maintaining good oral health care during pregnancy. Gao et al. [176] identified that while most (86%) Australian Aboriginal women in the study needed dental care, only a third (36%) accessed dental services. In this thesis, it was found that poor

self-rated oral health, social support as well as personal support were factors that limited accessibility and engagement in oral health services among Aboriginal and Torres Strait Islander women.[157, 167] The papers included in this thesis found that knowledge among Aboriginal and Torres Strait Islander women about oral health during pregnancy can vary significantly. Specifically, misconceptions about the physiology and safety of oral health and pregnancy do occur among some Aboriginal and Torres Strait Islander women and can deter women from seeking dental treatment. As part of the Baby Teeth Talk study, Poirier et al. [178] reported that misinformation about dental safety during pregnancy was a barrier to establishing oral health practices in early childhood. While oral health and pregnancy misconceptions have also been found in non-Indigenous populations in Australia and globally,[32, 77] this highlights the paucity of oral health information that Aboriginal and Torres Strait Islander women are receiving during pregnancy.

Based on the findings from this study, insufficient information is reaching Aboriginal and Torres Strait Islander women during pregnancy. Given that most of the studies reported in the systematic review (Paper 2) as well as the updated review of the literature focused on the postnatal period, this may be unsurprising. Goodman [180] noted that a lack of oral health advice or referrals from primary care providers was a barrier to improving maternal oral health in a group of American Indian/Alaska Native women during pregnancy. A recent policy statement published by Holve et al. [182] also supports the present study's findings. Aimed to improve ECC in Indigenous communities in the United States and Canada, the policy statement recommended that Indigenous women receive oral hygiene education as well as preventive dental care and routine dental assessments through community-based activities. This statement observed that implementing preventive intervention by the age of two was often too late, reinforcing the need for antenatal oral health promotion to be strengthened with early childhood oral health programs.

Recent literature suggests that the improvement of oral health knowledge and behaviours of mothers during pregnancy is limited in many of these postnatal programs, in both Australia and across the globe. In the Baby Teeth Talk study; for example, the only key message provided to Indigenous women during pregnancy focused on accessing the dentist during gestation, with oral health messages about ECC delivered postnatally. The study did not describe what advice given about recommended oral hygiene practices, potential misconceptions or knowledge about dental safety, or early childhood oral health care. Nevertheless, some of the strategies used in the studies that focused on the postnatal period could be utilised within antenatal programs. First Nations and Métis parents, caregivers, and community members in the qualitative study by Kyoon-Achan et al. [181] generated ideas on how to increase awareness about early childhood oral health. The participants identified that to effectively disseminate information about early childhood oral health would require more diverse sources of oral health information, including prenatal and postnatal programs from primary care providers, as well as online and print sources.[181] Moreover, participants in this study recommended increased collaboration with existing antenatal and postnatal programs to integrate oral health information. In the qualitative studies (Papers 3 and 4),[166, 167] a range of sources were similarly identified as being necessary to promote oral health during pregnancy and to reinforce key messages.

Cidro et al. [175] and Kyoon-Achan et al. [181] both stress the importance of first establishing relationships with clients to build trust, and to ensure that oral health messages are tailored appropriately and delivered in a timely manner. In the present study, Elders as well as Aboriginal health staff like AHWs and midwives[166, 167] were seen as potential people who could ideally provide key oral health messages, as they were likely to have established relationships with pregnant women. The results from the qualitative studies (Paper 3 and 4) further suggested that established relationships with non-dental health staff could mitigate

some of the challenges that may prevent Aboriginal and Torres Strait Islander women from accessing dental care or engaging in oral health behaviours. Trust that is developed between health care providers and the client may provide a sense of security, as clients may feel less judgement or shame about their oral health, and may be more likely to disclose more details about their oral health or concerns.[166, 167] Establishing trust may be an important factor in alleviating some of the oral health barriers faced by Aboriginal and Torres Strait Islander women, including a fear of dentists. Cidro et al. [175], who conducted a qualitative study nested within the Baby Teeth Talk study in Canada, identified that engaging parents to modify oral health behaviours required sharing personal experiences as well as having culturally appropriate and interpersonal communication skills to develop trust and rapport.

The qualitative papers in the Grinnin' Up Mums & Bubs study both found that oral health care was often associated with feelings of shame, fear, anxiety, and judgement.[166, 167] The main barriers to seeking oral health care for one group of American Indian/Alaskan Native women during pregnancy[180] similarly included a fear of dentists as well as a lack of symptomatic pain. Butten et al. [179], who explored Australian Aboriginal women's perspectives of oral health across the lifespan in Queensland, found that dental fear and anxiety were likely derived from traumatic childhood memories for some women. In addition, this current study found that other people's negative dental experiences and concerns for the safety of the baby were other reasons that contributed to reluctance to access dental care.[166, 167] Nevertheless, trust could support antenatal care providers in the delivery of culturally safe oral health promotion, that fosters choice and improved self-efficacy.[167] Promoting choice and self-efficacy, however, could be fostered if educational resources are disseminated in conjunction with verbal education that is tailored to the oral health needs of the client.[167] Addressing the oral health needs of clients was implicit in the study by Gao et

al. [176], who identified that Australian Aboriginal women who had poorer health service literacy were less likely to seek dental care.

The Aboriginal health staff in the qualitative study (Paper 3) noted that few clients accessed dental services despite experiencing oral health problems. Findings from the second qualitative study (Paper 4) suggested that of the Australian Aboriginal women who accessed dental services, many opted to access private dental services.[166, 167] These details indicate a potential lack of awareness of alternative and more affordable options for dental care during pregnancy. While public dental services offer free dental checks and treatments to eligible pregnant women along with a maximum waiting time of three months,[94, 97] one of the major limitations cited by the Aboriginal health staff was the lack of cultural safety.

The difficulty of booking dental appointments in the public sector was identified in both the qualitative study (Paper 4) and the systematic review (Paper 1).[157, 167] A potential issue with the existing policies for women who are eligible may be that waiting three months for a public dental appointment may be too late for women who book later in their pregnancy. Individuals may need to potentially wait until late in the third trimester to receive dental care, even though the second trimester is more comfortable for women to undergo treatment.[93] Participants across the Grinnin' Up Mums & Bubs study[166, 167, 183] discussed that even though Aboriginal and Torres Strait Islander women may have employment or have a household income greater than the threshold identified by the state dental health policy, they still may not be able to comfortably afford private dental care during pregnancy.

The burden of dental costs for women who are not eligible for public dental services has also been reported in Australia among a non-Indigenous refugee population.[184] During pregnancy, women and their families may need to budget for additional medical costs and expenses related to preparing for the arrival of a newborn. In addition, women may need to

prepare for a reduced income as individuals who are employed may require maternity leave postnatally. In the qualitative study (Paper 4) with Australian Aboriginal women, four out of 12 participants were not employed.[167] Four of the eight participants who were employed were on leave at the time of the interview. While this is not representative of Aboriginal and Torres Strait Islander women generally, it provides an insight into the factors that need to be considered for accessibility to public dental services. Integrating these considerations into existing antenatal and postnatal programs to create oral health continuity of care is an important step in developing an appropriate oral health model of care.

10.3 Perspectives of Promoting Oral Health During Pregnancy Through Aboriginal Health Staff

Findings from the scoping review (Paper 2) suggested that Aboriginal health staff could play a role in promoting oral health; however, there were no evaluated antenatal interventions in the Australian context. To identify the components of the intervention, the perspectives of Aboriginal health staff needed to be explored which was the rationale for the qualitative study (Paper 3). The updated review did not identify any new literature that explored the perspectives of Aboriginal health staff about oral health among pregnant women.

As seen in the qualitative study (Paper 3), Aboriginal health staff believed that they were ideally positioned to promote oral health among Aboriginal and Torres Strait Islander women during pregnancy precisely because of the trust and rapport that is cultivated with clients. However, as the health staff reported varied experiences, and levels of oral health training as well as knowledge, there is a need for specific oral health training so that Aboriginal health staff can integrate oral health knowledge into practice. The scoping review (Paper 2) found that among the Indigenous health workers who promoted oral health, they were trained through oral health programs that were specifically designed for the health staff.

Even though non-dental health staff do not have the training nor scope to provide comprehensive dental assessments or treatments, they can still engage in oral health screening which may involve standardised questions to identify the risk of poor oral health.[158] Unfortunately, the scoping review identified that there are currently no maternal oral health screening tools adapted specifically for Indigenous health workers. Despite this, from the perspectives of Aboriginal women (Paper 4), a simple oral health screening tool would be acceptable. The scoping review (Paper 2) highlighted that the two-item screening tool by George et al. [105] could be used by Aboriginal health staff, as it is a validated tool for Australian pregnant women; however, this tool would need to be reviewed by Aboriginal health staff to ensure that it is delivered in a way that is culturally safe.

The perspectives of Aboriginal health staff, explored in the qualitative study (Paper 3), further illuminate the complex environments that AHWs and FPWs live in and work. AHWs and FPWs have responsibilities both as health workers, but also as members within the community. These two 'worlds' do not always coalesce and can conflict with each other at times. This conflict appeared to be especially apparent among Aboriginal health staff who worked within the public health organisation. Thus, there is the need to consider the external health systems that may negatively impact on the cultural safety of Aboriginal and Torres Islander women during pregnancy. The experiences of participants shared in the Grinnin' Up Mums & Bubs study demonstrate that receiving dental care during pregnancy is complex, influenced by historical policies as well as social and cultural factors. Even though free public dental services may be available to many Aboriginal and Torres Strait Islander women in Australia, the qualitative findings (Paper 3) suggest that previous experiences of institutional racism or association with government institutions can deter access to dental services.

The earlier systematic review (Paper 1) also found that a lack of flexibility with dental services such as with appointment bookings can further discourage some Indigenous women from accessing public dental care. Although the provision of dental care at ACCHSs could be both an affordable and culturally safe option for some women, the complexity in eligibility for ACCHS services often makes it difficult for many Aboriginal and Torres Strait Islander women to access dental care. There is an additional concern for women who are non-Indigenous but have Aboriginal and Torres Strait Islander children.[185] The complexity in accessing ACCHS dental services for some Aboriginal and Torres Strait Islander pregnant women has not previously been documented in the literature, but highlights an area that requires a coordinated policy response between government and ACCHSs, to ensure a broader approach to provision of oral health care.

A concerning finding in this study was the impact of racism and discrimination on oral health. The systematic review (Paper 2) suggested that individual experiences of racism impacts oral health care practices and access to the dentist.[157] Yet, ongoing institutional barriers to dental care resulting from colonisation and intergenerational trauma were only clearly identified in the qualitative study with Aboriginal health staff (Paper 3), whereas they were not mentioned in the interviews with Aboriginal women (Paper 4).[157, 166] While racism was not explicitly identified by the Aboriginal women interviewed, many women instead, spoke about the importance of trust and connection with healthcare providers and shared experiences of where they had received culturally safe and non-discriminatory health care. Previous research with different minority populations in the United States found that racism can have an inverse relationship with satisfaction of care, and therefore, an indirect effect on the trust developed with healthcare providers.[186] Thus, while the impact of systemic racism and discrimination was not explicitly identified, it was implicit in the way that the women spoke about their experience of care.

Even though oral health self-efficacy was identified as a potential factor in promoting oral health,[157, 166, 167] racism has been shown to have an adverse effect on self-efficacy.[187] The findings by Macedo et al. [188], which drew on a sample of Australian Aboriginal women from the Baby Teeth Talk study, found that about a third of Aboriginal women have reported experiences of racism in a public setting, and that the women who felt uncomfortable about their teeth also experienced relatively higher rates of discrimination as well as levels of stress.[188] Experiences of racial discrimination can increase the risk of self-reported impaired oral health by approximately 40% in a non-Indigenous Australian population.[189] Thus, the flow-on impact of systemic sources of racism, including the long-term effect of dental policies, need to be addressed within the development of a model of care.

10.4 Developing and Piloting the Grinnin' Up Mum & Bubs Model of Care

The scoping review (Paper 2) did not identify any evaluated, culturally appropriate oral health model of care that involved capacity building Indigenous health workers for pregnant women. An updated review of the literature found an additional 12 articles; however, none of the articles described an evaluated program that largely focused on promoting maternal oral health. The components of the Grinnin' Up Mums & Bubs model of care were derived from the concerns and needs arising from the preceding thesis publications; that is, to address the lack of antenatal oral health knowledge by producing a training workshop for Aboriginal health staff; to develop culturally safe oral health promotion resources that would facilitate education for pregnant clients; and implement an oral health referral pathway to facilitate increased access to dental services during pregnancy.

Of the literature that was included in the updated scoping review, seven articles were linked to the Baby Teeth Talk study.[175, 177, 178, 188, 190-192] While the Baby Teeth Talk study as well as the off-shoot study in Canada, Nishtam Niwiipitan,[193, 194] aimed to employ community-based researchers to provide anticipatory guidance about the need for pregnant

women to seek dental care during pregnancy, the focus of these studies was the postnatal period. The literature was based in Australia, Canada, and the United States, with eight articles based in Australia. Five were linked to the Baby Teeth Talk study[177, 178, 188, 190, 191]; two followed up on the Smiles Not Tears postnatal oral health intervention[195, 196]; and the last article was a qualitative study.[179]

Although antenatal care providers have been identified as appropriate individuals who could promote oral health among Aboriginal and Torres Strait Islander women as part of the model of care, oral health advice needs to be delivered in ways that do not provoke feelings of judgement and shame for the client and emphasise cultural safety. Thus, Aboriginal and Torres Strait Islander antenatal care providers were ideal candidates within the model of care. As seen in the qualitative study (Paper 3), Aboriginal health staff found it acceptable to deliver oral health advice to Aboriginal and Torres Strait Islander women during pregnancy.[166] More importantly, Aboriginal health staff already focus on establishing trust, promoting self-efficacy, and work in ways that emphasise cultural safety,[166] which made them a critical and central part of the Grinnin' Up Mums & Bubs model of care.[166, 167] In other models of care, like the Baby Teeth Talk study, community-based researchers (who were a part of the community) were also central to the delivery of the program and had the advantage of possessing similar ethnic backgrounds and being insiders within the community to develop rapport.[175]

While personal and cultural backgrounds can be a source of trust-building, both Cidro et al. [175] and the Aboriginal women in this study (Paper 4) revealed potential issues around lateral violence, where one group of people work to undermine another group of people or individuals, often socially within the same community.[197] This was seen in the experiences of some Aboriginal women in the qualitative study (Paper 4), who reported a lack of confidence in disclosing personal oral health information to Aboriginal and Torres Strait Islander health

care providers or accessing certain ACCHSs. Nevertheless, Aboriginal and Torres Strait Islander women who may not wish to disclose oral health information to Aboriginal health staff could choose instead to contact other health care providers with whom they have established trust and who provide care that focuses on cultural safety.[167]

Findings from both qualitative studies informed the knowledge component of the training as well as the three key messages that were integrated across the oral health promotion resources.[166, 167] Some of the Aboriginal health staff already had some oral health knowledge, such as the potential for oral health to deteriorate during pregnancy and types of food that could be consumed in place of foods and drinks that have higher sugar content.[166] To strengthen what the Aboriginal health staff were already doing, these topics were integrated into the training and oral health promotion resources. From the interviews with the Aboriginal women, it was clear that various women had oral health problems during pregnancy, were concerned about the safety of dental treatment during pregnancy for their unborn child and were unsure about the link between pregnancy and oral health.[167] These concerns also became focus areas for the training and informed the health messages that were developed across the oral health promotion resources. As postnatal oral health care is a key emphasis in the existing body of evidence among Indigenous populations[181, 190, 191, 196, 198] and policy recommendations among Indigenous communities,[182] messages about early childhood oral health were also included to highlight the need for ongoing continuity of oral health messaging across the lifespan.

One of the health messages delivered in the Grinnin' Up Mums & Bubs model of care focused on how dental treatment is both important and safe during pregnancy. Thus, an essential aspect of the model of care involved the referral of Aboriginal and Torres Strait Islander pregnant women to dental services. Referrals consisted of two components: an oral health screening tool and delineating the potential dental referral pathways for pregnant

clients. The oral health screening tool that was developed by George et al. [105] was adapted by the Aboriginal health staff to enhance cultural safety. To mitigate the embarrassment, judgement and shame that could be associated with discussing poor oral health, the Aboriginal health staff modified the delivery of the tool (into the whiteboard magnet) so that women could choose to engage with the resource and consider their oral health needs during pregnancy. This was a similar approach used by Smith et al. [199] who adapted a mainstream ECC screening tool, and identified that the early childhood oral health screening tool used by the AHWs was designed to facilitate a sense of shared responsibility with the carer.

The training workshop clearly outlined the potential dental services that clients of the AHWs could access based on eligibility requirements. For the model, the way that dental appointments were booked for clients were modified to reduce institutional barriers identified in the earlier qualitative studies. A direct number and e-mail address to an Aboriginal dental assistant, instead of to a call centre, was shared with the AHWs. Thus, instead of liaising with non-Indigenous call centre administrative staff, Aboriginal and Torres Strait Islander women could more efficiently book an appointment through an Aboriginal dental assistant. While the impact of this aspect of the model of care could not be piloted, this present study found that the AHWs believed this was acceptable and culturally appropriate. The inclusion of an Aboriginal dental assistant to facilitate appointment bookings for Aboriginal and Torres Strait Islander Australians has not been reported elsewhere. However, in studies involving other populations in Australia, Aboriginal health staff have had a role in liaising with dental staff to manage appointment bookings.[200, 201] In Canada, the study by Mathu-Muju et al. [198] identified that the Children's Oral Health Initiative aides, also termed as community health workers in the study, were imperative to promotive program uptake and facilitated access to preventive dental care for young children.

Ensuring that oral health promotion is delivered safely was one of the critical recommendations made by the AHWs in the evaluation of the Grinnin' Up Mums & Bubs model of care.[183] Specifically, the AHWs highlighted the need for oral health advice to be flexibly delivered and tailored to the clients' needs. The need to tailor oral health messages for Aboriginal pregnant women was also a significant finding in Paper 4. The AHWs who participated in the evaluation (Paper 5), observed that while they were well-positioned to disseminate culturally safe oral health advice to many Aboriginal and Torres Strait Islander pregnant women, other antenatal care providers also needed to receive this training to avoid overlooking clients that may not see AHWs during pregnancy.[183] Some of the postnatal mothers in the qualitative study (Paper 4) recounted how they could not see an AHW during pregnancy, as they were considered to have a high-risk pregnancy and thus needed to see a specialist instead throughout their pregnancy. While the scoping review (Paper 2) included studies where specialists like obstetrician-gynaecologists have received oral health training, there were no studies that trained non-Indigenous health staff to promote oral health promotion in ways that were culturally safe for Aboriginal and Torres Strait Islander women. Durey [202] highlighted that cross-cultural education could lead to improvements in culturally respectful care delivered by non-Indigenous clinicians in the short-term and potentially reduce the impact of racism. The recommendations made by the AHWs in the pilot (Paper 5) were that the delivery of oral health advice to pregnant women needed to be empowering; provided at appropriate times; and in ways that do not evoke feelings of shame about poor oral health status or behaviours. These reflections were corroborated by Aboriginal women (Paper 4) who identified the importance of self-efficacy by receiving antenatal oral health information at appropriate times from health care providers as well as receiving a sense of support and choice about their oral health care.

The piloting of the Grinnin' Up Mums & Bubs model of care found an emerging trend of increasing oral health knowledge and confidence with the AHWs who participated in the study. Increasing knowledge and confidence were confirmed through both the qualitative and quantitative data gathered in the pilot study. The qualitative pilot findings revealed that high satisfaction with the model of care, inclusive of the training and the resources, stemmed from the content being related to areas that were relevant, easily integrated, culturally appropriate and within the scope of practice of the AHWs. A similar model of care for the postnatal period, the Smiles Not Tears program, also developed a one-day training workshop and oral health resources for AHWs to deliver advice to parents of Aboriginal and Torres Strait Islander children.[195, 196, 199] Similar to the Grinnin' Up Mums & Bubs model of care, the Smiles Not Tears pilot reported that the AHWs had high satisfaction with the model. While Smith et al. [199] did not use an oral health knowledge and confidence instrument, AHWs in that study believed that the training increased their knowledge and confidence to deliver oral health advice. Another study by Pacza et al. [203], cited in the scoping review (Paper 2), also developed an oral health training program for AHWs in rural and remote areas, and found that the participants perceived they had a good understanding of the learning objectives post-training and were satisfied with the training.

Unfortunately, modifications to accessing public dental services were limited due to restrictions in public dental policy in NSW. Despite limitations with the referral pathways linked to the Grinnin' Up Mums & Bubs model of care, the provision of oral health advice and screening for potential oral health problems could still be effective in improving long-term oral health outcomes of the mother and child. A preprint of the long-term evaluation of the MIOH's participants and offspring found that higher oral health knowledge among pregnant women at the end of the program was a predictor for lower rates of ECC in four-year-old children.[204] Even though the current study did not evaluate the impact of the model

on the practice of AHWs, nor on the knowledge of Aboriginal and Torres Strait Islander women, the findings of an Australian study by George et al. [204] support the need for effective communication about oral health between antenatal care providers and clients. Considering the needs of Aboriginal and Torres Strait Islander women, it reiterates the recommendations of AHWs in the pilot program to deliver oral health advice that is tailored to the clients' needs and situations, rather than as standardised oral health advice.

Recent evidence also supports the cost-effectiveness of an oral health model of care focusing on capacity-building antenatal health staff. An economic evaluation of the MIOH model of care found that an education-only intervention for midwives was more cost-effective in the short term compared to an intervention involving education and dental treatment.[109] At six months, however, this study found that dental treatment is still required for pregnant women to see improvements in oral health. These findings are promising in light of the Grinnin' Up Mums & Bubs study, as it suggests that despite delays or longer waiting times for dental appointments, women will still receive benefit from receiving oral health education from AHWs.

10.5 Reflections on Adapting the Conceptual Framework

Ethically, research that is conducted with Aboriginal and Torres Strait Islander communities needs to involve extensive consultation with relevant stakeholders within the community.[137] However, the frameworks that are used to guide research studies can vary greatly depending on the study context and aims. In line with the Australian government's 2020 Close the Gap report recommendations to work in genuine partnership with Aboriginal and Torres Strait Islander organisations and peoples,[12] the Grinnin' Up Mums & Bubs study sought to focus on fostering community engagement as well as a sense of ownership with the study among the Aboriginal health staff. To avoid a tokenistic approach and to ensure that community engagement was properly undertaken, a conceptual framework was adapted from

the work of Kovach [131] While the work by Kovach [131] on Indigenous methodologies has been cited in extensively across a range of studies[205-208]; to our knowledge, this is the first time the framework has been adapted to inform the development of an oral health model of care. The study by Cidro et al. [205], which examined breastfeeding practices as an intervention for ECC in the Baby Teeth Talk study, cited the work by Kovach [131] as informing some of the study's methodologies, but did not report on whether or how the conceptual framework was employed or adapted.

Adapting the original framework was necessary, as the research was led by a non-Indigenous woman. The three linking keystones at the centre of the conceptual framework, referenced in Figure 6 (Chapter 4), became guiding principles throughout the study. *Self-Determination*, the first keystone, focused on ensuring that Aboriginal and Torres Strait Islander peoples were actively involved in the key decision. This was linked to *Partnership* as a keystone, where the Aboriginal health staff were supported by the researchers to decide on the outcomes of the study as well as how the research should be conducted. Taking this approach fostered and established some trust, particularly with the Aboriginal health staff. Combining self-determination and partnership organically fostered the third keystone – *Indigenous Knowledge*. Indigenous knowledge was collected throughout the study. The empirical research described in Chapter 7 focused on collecting knowledge derived from the perspectives and experiences of Aboriginal health staff. The knowledge generated from the insights of Aboriginal women in Chapter 8 was also the basis for the development of the model of care. Moreover, the AHWs who participated in the pilot study (Chapter 9) provided additional knowledge to enhance the model.

As part of the last PAR phase, *Giving Back*, the study ultimately delivered on the initial outcomes stipulated by the Aboriginal health staff through a process of working in partnership as well as working to focus on ways of knowing, being and doing that are

culturally safe. Employing the strategies outlined in Chapter 5 to foster involvement of Aboriginal and Torres Strait Islander peoples and uphold Aboriginal and Torres Strait Islander knowledges were essential to the implementation of the conceptual framework. Strategies such as involving Aboriginal Research Assistants in qualitative analysis, including in the early immersion stages of analysis, provided a cultural lens that avoided a more myopic Western perspective. Involving the Aboriginal health staff from the conceptualisation all the way to the implementation and pilot of the intervention meant that Aboriginal and Torres Strait Islander peoples could steer the study, guide knowledge generation and ensure that the knowledge generated would result in a net benefit for Aboriginal and Torres Strait Islander communities.

Using the adapted framework was advantageous on a few fronts. Firstly, it established the spirit of the research: the Aboriginal health staff were the experts in the field and without the knowledge, partnership and engagement of the Aboriginal health staff, the research would not have taken place. In the pilot, the AHWs recognised the need for oral health to be promoted during pregnancy, recommended how to conduct the research to inform the development of the Grinnin' Up Mums & Bubs program, and were involved as participants in the study as well as in the development and pilot of the program. The ongoing consultation with the Aboriginal Action Group also informed and shaped the development of the program. Initial meetings between the candidate and stakeholders initiated a long-term partnership over the course of more than three years.

Secondly, using the conceptual framework addressed concerns around knowledge creation and ownership. As the model of care was developed in partnership with the Aboriginal health staff, it was recognised from the conception of the research that outputs would be co-owned, so that the components of the model of care could be adapted and integrated into the services provided by the Aboriginal health staff to ensure sustainability

beyond the end of the candidate's research.[209] This informed the decision to contract an Aboriginal graphic designer to create the art for the Grinnin' Up Mums & Bubs study, and to purchase an unlimited exclusive licence for the work.

PAR created a model that was tailored specifically to the Western Sydney community where the study was conducted. The need to tailor the resources so that they were appropriate for the community has been documented in other literature[210-212] and was evident during consultation for the resources. In the use of language, for example, while one commonly used phrase in the brochure was seen as acceptable within one Aboriginal and Torres Strait Islander community, its usage was less culturally appropriate among Aboriginal and Torres Strait Islander stakeholders who resided in a different community in NSW. Thus, in adapting this intervention to a different Aboriginal and Torres Strait Islander community, extensive consultation and respectful engagement is needed to ensure that the language, graphics, and messages are relevant and culturally appropriate to the community context.

One of the most challenging aspects about using PAR was the journey that the candidate needed to undertake to understand the power dynamic and structures that exist within research. As the candidate was situated within a university and worked with a service that operated within a government public health organisation, the timeline for the research was expected to be three years. A strict deadline was a significant conflict to the needs of the Aboriginal health staff and services. Previous Australian literature have documented the necessity of flexible timelines to show respect and foster sufficient engagement with Aboriginal and Torres Strait Islander communities.[209, 213] This conflict of expectations and needs anticipated throughout the study increased the risk of diverting power and autonomy from the Aboriginal and Torres Strait Islander stakeholders. To assist with mitigating this risk, the candidate journaled throughout the research journey to reflect on conversations and situations and to identify the power imbalances that were present. Journaling was an

opportunity for the candidate to realise the necessity of time in any PAR methodology, and to recognise that flexibility with time affords adequate engagement and participation.[214, 215]

The process of reflection on existing power structures also evoked feelings of doubt and legitimacy, with the candidate being a non-Indigenous person leading an Aboriginal and Torres Strait Islander research project, which was a strong theme in the earlier journal entries. This internal struggle may reflect some of the conflict that arose from recognising the power imbalances that may be present. While journaling gave some solace, over time these feelings resolved as relationships with the Aboriginal health staff and members of the Aboriginal Action Group were strengthened through various stages of the research. One strategy that was employed was to invite Aboriginal health staff to co-present findings of the study at conferences, and the opportunity to co-author the thesis papers. Another strategy that was used by the candidate was to employ Aboriginal research assistants to assist with analysing data in Papers 3 and 4, and to assist with developing the components of the model of care, particularly through consultation. The strategies that were used as part of the conceptual framework provided additional rigour to the overall methodology, as they provided opportunities for Aboriginal and Torres Strait Islander people to inform, engage with, and ultimately strengthen the research.

10.6 Impact of COVID-19 on Study Outcomes

It is important to note that although the pilot findings suggest a trend towards the Grinnin' Up Mums & Bubs model's effectiveness in improving oral health knowledge and confidence of AHWs, COVID-19 had a significant impact on the overall study. The Aboriginal health staff from one site, who were initially involved in the earlier stages of the study, had to withdraw, as their antenatal services were suspended for over a year due to the public health restrictions in NSW. Consequently, the staff at the second site could not participate in informing specific aspects in the development of the model of care nor in the

pilot test of the model. The perspectives of the staff from this service would have been insightful, as the service was an ACCHS that also offered dental services. Nevertheless, an agreement between the candidate and the service was made to adapt the existing program for the service and pilot it among the staff once the public health restrictions were relaxed and the workload demands reduced.

COVID-19 also emphasised the need to follow cultural protocols throughout the study. Since the public health restrictions associated with COVID-19 limited physical contact with the Aboriginal health staff, the research team could not develop the model of care directly with the Aboriginal health staff, which delayed the timeline. For the pilot of the program, options to move the training to an online platform were explored. However, the Aboriginal and Torres Strait Islander researchers within the team identified that this approach would not be appropriate for the Aboriginal health staff, who experienced increased workloads during the pandemic and would likely not be able to engage adequately in the research. Furthermore, an online training program was not seen as appropriate, as it contradicted the recommendations given by the Aboriginal health staff (Paper 3). In the pilot (Paper 5), one of the AHWs reflected that poor internet connectivity could be a barrier for staff to engage in online training. Indeed, yarning is a form of communication that includes building trust and rapport between participants[155] and may be more difficult through a video-conferencing platform. Within a non-Indigenous context, a review by Morrison-Smith and Ruiz [216] identified that challenges associated with virtual collaboration included missing non-verbal cues between participants; greater difficulties in building trust; the need for informal face-to-face communication; and the need for technical competence to use the platform and engage in the collaboration.

10.7 Strengths and Limitations

The Grinnin' Up Mums & Bubs study is the first study in Australia to develop and pilot a model of care that capacity builds Aboriginal health staff to promote oral health among Aboriginal and Torres Strait Islander women during pregnancy. As part of this research, knowledge was generated about the oral health needs of Aboriginal and Torres Strait Islander women during pregnancy as well as the scope of oral health research conducted among Indigenous women internationally. The findings also identified, for the first time, that Aboriginal health staff believed that they would be able to promote oral health among Aboriginal and Torres Strait Islander women as part of the provision of holistic antenatal care. Another strength of this study was the use of PAR to strengthen the ways that Aboriginal and Torres Strait Islander people could be involved in the research. By working together with key stakeholders, the various evidence-based, culturally appropriate resources that were developed were found to be acceptable and feasible to implement into practice. Thus, this study was also successful in fulfilling the original outcomes stipulated by the Aboriginal health staff at the conception of the study while utilising research methods that were recommended by the Aboriginal health staff. Another potential strength of this study is that the development and consultation processes have been documented extensively (Paper 5), providing a roadmap for other organisations to follow and tailor the model of care to the needs of another community.

The study also had several limitations. The two published reviews that were conducted were biased to literature published in English, which likely limited the breadth of articles that were retrieved to a handful of mostly English-speaking countries. Conclusions from these two reviews, therefore, can only be interpreted within a limited context. Terminology was likely another limitation in these reviews, as the Indigenous peoples are

unique and diverse; and the search terms used may not have been extensive or sensitive enough to identify every Indigenous group in the world.

The review that explored the role of Indigenous health workers in promoting oral health among pregnant women may have also failed to recognise terms used for Indigenous health workers, as this can vary greatly. Furthermore, there may be programs that were conducted, but not published, due to time constraints faced by health staff who work in Indigenous communities. Nevertheless, a grey literature search was conducted in the scoping review to identify potential unpublished literature.

As this study used PAR, it was important to recognise that the emphasis was on tailoring the model of care to the needs of the communities involved in the study. The manuscript that published the perspectives of Aboriginal health staff was limited to two antenatal services located in the Greater Western Sydney region; thus, it should not be generalised to the needs, experiences, or perspectives of Aboriginal health staff in other settings. Similarly, the qualitative paper was an in-depth exploration of the perspectives of Aboriginal women in NSW and did not report on the needs of Torres Strait Islander women.

One of the limitations with the interviews with the Aboriginal women was that the interviewer was the candidate, a non-Indigenous woman, and many of the interviews were conducted over the phone. While this can limit the trust and rapport that is developed, the phone interviews were, on average, longer than the face-to-face interviews, suggesting that some participants were more comfortable communicating over the phone.

One of the sites originally involved in the research requested for a hiatus due to the impact of COVID-19 on the service. The temporary withdrawal of this site from the research limited the sample size in the pilot study. While this restricts the generalisations that can be

undertaken, the emerging trend of increasing oral health knowledge and confidence suggests that the pilot findings are a successful proof-of-concept.

The following chapter will conclude the thesis and provide recommendations for future practice, policy, and research.

Chapter 11: Conclusions and Recommendations

11.1 Conclusion

This work is the first to develop and pilot a model of care designed to capacity build Aboriginal health staff to promote oral health among Aboriginal and Torres Strait Islander women during pregnancy. Little evidence had been published on the potential role of Indigenous health staff across the globe in maternal oral health promotion, and there was limited in-depth knowledge about the oral health needs of Aboriginal and Torres Strait Islander women during pregnancy in Australia to inform a culturally safe model of care.

This study established that Aboriginal health staff had a potential role in promoting maternal oral health among Aboriginal and Torres Strait Islander women. Moreover, Aboriginal health staff believed that oral health promotion could be integrated in their provision of antenatal care. The Aboriginal health staff identified that the knowledge, approach, and experiences of AHWs and FPWs could facilitate oral health promotion. They also recognised that their focus on cultural safety and building rapport with Aboriginal and Torres Strait Islander women could facilitate this role. The study findings also suggest that the integrated oral health role of Aboriginal health staff could complement the needs of some Aboriginal and Torres Strait Islander women, who may require additional support and tailored advice for improved oral health care during pregnancy.

From the perspectives of Australian Aboriginal women, it was identified that while oral health could be a concern for some women during pregnancy, it was not always prioritised due to other competing responsibilities. Prioritising oral health during pregnancy appeared to require receiving the appropriate oral health advice as well as support from trusted and culturally safe healthcare providers. While participants were receptive to a range of oral health promotion resources, it was essential that dissemination of these resources were accompanied by tailored, verbal advice to ensure it was addressing areas of need. Finally, in

both qualitative studies, it was clear that there was a need to improve the accessibility of dental services for many Aboriginal and Torres Strait Islander women.

Using the PAR methodology to guide the research provided Aboriginal health staff, particularly AHWs, the capacity to meaningfully drive the study. PAR required significant collaboration to generate the knowledge and build the model of care from a grassroots level. By employing this approach, the components of the Grinnin' Up Mums & Bubs model of care received a high level of satisfaction from the AHWs, who acknowledged that it was culturally appropriate, relevant to practice and built on the AHWs' existing strengths. The initial findings from the pilot suggest that the model could be effective in capacity building AHWs, by increasing oral health knowledge and confidence. As the components of the model were derived from the earlier needs assessment in the research, these components were seen to be easily integrated into the AHWs' existing practice, which may enhance sustainability over the long term, beyond the end of the project.

11.2 Recommendations

The findings from the Grinnin' Up Mums & Bubs study have highlighted important recommendations for clinical practice, policy, and future research to improve the reach and potential of the model of care.

11.2.1 Clinical Practice

This study demonstrated that Aboriginal health staff are receptive to promoting oral health, and that with the appropriate training, it can be a part of practice. However, to ensure long-term sustainability within the service where the pilot was undertaken, there is the need to consider a few factors. The antenatal service's management staff would need to support the rollout of the oral health training to any new staff as well as any future refresher training. It is likely that the additional time and resources taken to train new staff would need to be

accounted for in workload allocations or that different staff are employed to provide the oral health training. Management staff would also need to ensure that resources are available to support the ongoing printing and manufacturing of the oral health promotion resources to distribute to Aboriginal and Torres Strait Islander families. Finally, oral health promotion messages need to be reinforced and tailored appropriately across the lifespan. Thus, the Grinnin' Up Mums & Bubs model of care would also need to be delivered in conjunction with postnatal programs focusing on early childhood oral health.

Outside of the service where the pilot was undertaken, there is the need to broaden the reach of the model of care. As the services that were involved in the study targeted a specific group of Aboriginal and Torres Strait Islander families, some Aboriginal and Torres Strait Islander women may not utilise these services. Many women may instead receive antenatal care through a specialist, a midwife at the hospital, through the GP or through another program. Thus, the existing model of care would need to be tailored appropriately to ensure that it addresses the specific needs of the Aboriginal and Torres Strait Islander women who access these services.

Adapting the existing Grinnin' Up Mums & Bubs model of care to another context may include updating the oral health promotion resources to ensure that language and art are culturally appropriate within the community, are endorsed by key organisations, and that referral pathways are tailored for streamlined access to dental care. It is also important that the antenatal oral health training is available to a wide range of health care providers. To increase the capacity of antenatal care providers, more opportunities for training are needed. One strategy for AHWs and Aboriginal health practitioners could be to integrate antenatal oral health training into the educational curricula. Continuing professional development (CPD) courses could also enhance capacity building of Aboriginal health staff. For Aboriginal health practitioners, who are registered health professionals with the Australian

Aboriginal and Torres Strait Islander Health Practice Board,[217] undertaking a maternal oral health training program that provides CPD points could incentivise uptake. However, while health care providers who are Aboriginal and Torres Strait Islanders and may already focus on delivering culturally safe care, the program would also need to be adapted to ensure that non-Indigenous antenatal staff are able to deliver oral health messages in ways that promote cultural safety.

How training is delivered may also need to be further considered. While the study findings and the literature support face-to-face training, a blended learning approach could be used, particularly in more rural or remote areas. In this model, training content may be delivered online, and resources could be provided by Aboriginal and Torres Strait Islander health staff who may also assist with accessing the content. Individuals could travel to different locations and yarn with participants about feedback related to the training and how oral health could be discussed in practice. Further research, however, would need to be undertaken to determine an appropriate model.

11.2.2 Policy Change

The study's findings suggest that the model of care could mitigate some of the barriers for improved oral health among Aboriginal and Torres Strait Islander pregnant women. However, various existing policies seem to limit the potential effectiveness of the model of care. The policies stipulated by the Australian NSW state government allow for individuals who have a valid concession card to access public dental care. For pregnant women, the policy recommends an appointment within three months of booking. However, as seen in the findings of this study, this policy needs to be broadened to ensure that a wider range of pregnant women are eligible for a dental check during pregnancy.

Depending on the government's budget, a broader approach where all pregnant women are eligible for a free public dental check could be implemented. However, as there are social inequalities across Australia, a more nuanced approach could also be adopted. Families with a household income that exceed the threshold for a concession card by a small margin may require additional support to access affordable dental care, particularly for women during pregnancy. To ensure equity, one option could be that some women who exceed the income threshold could pay a small fee for dental care at a public dental service. Similar to the Medicare Child Dental Benefits Scheme (CDBS), where the government subsidises private dental care for children from low-income families, private dental check-ups during pregnancy could be subsidised by the government. Using a scheme that is similar to the CDBS could effectively reduce the waiting time at public dental services as well as increase cost-effectiveness. An economic evaluation of the MIOH model of care, which has similarities to the Grinnin' Up Mums & Bubs model, calculated that subsidising the cost of a dental check-up during pregnancy was more cost-effective over the long term compared to the existing practice. However, as the MIOH economic evaluation only focused on Australian women generally, improving the accessibility to dental care for Aboriginal and Torres Strait Islander women may demonstrate even greater cost-effectiveness of the intervention since AHWs have a lower base rate salary compared to midwives in NSW.[218, 219] Thus, even though the initial costs can be significant, it could outweigh the long-term social, health and economic costs related to poor oral health and dental hospitalisations among Aboriginal and Torres Strait Islander women and children.

One component of the model of care was that Aboriginal and Torres Strait Islander women would have the option of booking a public dental appointment through an Aboriginal dental assistant to enhance the cultural safety of the service. To increase the cultural safety of all public dental services, however, it is important that Aboriginal and Torres Strait Islander

families across NSW are given an option to book an appointment through an Aboriginal and Torres Strait Islander person. A direct contact with an Aboriginal dental assistant may assist in reducing some of the barriers associated with navigating through the public dental system. The need for more Aboriginal dental staff corresponds with the National Aboriginal and Torres Strait Islander Health Workforce Strategic Framework [220] as well as the NSW Aboriginal Oral Health Plan [221] which both identify the need for more Aboriginal and Torres Strait Islander clinical staff. Nevertheless, it is essential that Aboriginal health staff are available across all points of care at a public dental service. In the absence of Aboriginal dental staff at the clinic, Aboriginal health staff could be employed to call clients before and after dental appointments. Where negotiated, AHWs could also accompany clients to public dental services. These strategies may assist to redress some of the issues identified in this study around cultural safety, systemic racism, and ultimately, accessibility.

For women who prefer to access dental care through ACCHSs, policies pertaining to eligibility of dental care may need to be negotiated across some services. This study extensively explored the complex challenges that arise for some Aboriginal and Torres Strait Islander women, who are not eligible to access ACCHS, due to a culmination of Australian historical and social policies discriminating against Aboriginal and Torres Strait Islander peoples. Furthermore, there is the need to ensure coverage for non-Indigenous pregnant women who have an Aboriginal and Torres Strait Islander partner. These complexities highlight the need for governments to collaborate with ACCHSs to identify strategies to improve access to culturally safe dental care for Aboriginal and Torres Strait Islander families in need.

11.2.3 Future Research

As this study only piloted the model, there is the need for long-term evaluation and follow up of the model of care. Long-term follow up would need to identify whether oral

health knowledge and confidence among Aboriginal health staff are sustained, or whether an additional supplement to the training is required. A larger sample size would also be necessary to determine whether the increase in knowledge and confidence are significant, as well as identify areas of training that would need to be enhanced.

The impact of the model of care on the oral health knowledge, attitudes and practices of Aboriginal and Torres Strait Islander women would also need to be explored. Specifically, future research should focus on whether oral health knowledge and attitudes during pregnancy are improved. It would also be important to establish whether oral health behaviours, such as rates of toothbrushing and access to dental services change as a result of the implemented model. Since the number of oral health promotion resources developed were limited, additional research should explore the impact of dental products such as a toothbrush and toothpaste on the oral health of Aboriginal and Torres Strait Islander women.

While the impact on ECC of the MIOH model of care has been evaluated, it would be important to determine whether the Grinnin' Up Mums & Bubs model of care would be effective in reducing ECC, particularly if combined with a culturally safe early childhood oral health program. Given that Aboriginal and Torres Strait Islander children have higher rates of dental hospitalisation due to severe ECC, it would be insightful to conduct an economic evaluation to calculate the potential savings of the Grinnin' Up Mums & Bubs model.

To integrate the Grinnin' Up Mums & Bubs model of care into another community or service, the principles of PAR need to be employed to ensure a successful translation of the model. As demonstrated in this thesis, it is essential that the Aboriginal health staff who deliver antenatal care to clients are supported to identify how best to adapt the model of care to meet the oral health needs of Aboriginal and Torres Strait Islander families. Although Indigenous peoples in other countries may have significantly different oral health needs and

access to health care systems, using PAR methodology to drive the development and implementation of a model would still be a culturally safe way to approach the research.

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Appendices

Appendix	Description
Appendix 1	Participant information sheet for focus groups with Aboriginal health staff
Appendix 2	Consent form for focus groups with Aboriginal health staff
Appendix 3	Demographic information sheet for focus groups with Aboriginal health staff
Appendix 4	Flyer for interviews with Aboriginal and Torres Strait Islander women
Appendix 5	Participant information sheet for interviews with Aboriginal and Torres Strait Islander women
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Appendix 2: Information sheet for Aboriginal Health Workers

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

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This study aims to train Aboriginal Health Workers to help keep women's teeth and gums healthy during pregnancy. Making sure women have a healthy mouth during pregnancy can help make sure their child will have healthy teeth.

If you would like to join, please read the following and complete the consent form.

What will I be asked to do?
- You will be asked to yarn (tell your story) in a focus group about your experiences in oral health with pregnant women and their children.
- We will also ask you about how you would like to deliver dental care to pregnant women.
- This focus group will be led by [principal investigator] and [insert name of Aboriginal action group member/research supervisor].
- Before the focus group, you will be asked some background information about yourself (e.g. gender, age, years worked, etc).
- Joining this study is entirely up to you. You do not have to join if you do not want to for any reason.
- You will need to be working in an Aboriginal Health Worker role and work with pregnant women to join the focus group.

Where will the interview be?
- The focus group will be at a suitable time and place at your clinic.
- It may take up to 1 hour. This depends on how much you would like to share.
- The focus group will be audio recorded.

Will I get anything from joining the study?
- Sharing your thoughts and stories will help shape a training program and oral health resources for Aboriginal Health Workers. You will be able to use these resources and receive training about pregnant women's oral health.
- Food and drinks will be given during the focus group.

Are there any risks?
- It is unlikely you will experience any discomfort during the study.
- If you feel uncomfortable or upset, the focus group will be stopped and provide appropriate support.

How do I join?
- If you would like to join the focus group, please let [insert name of Aboriginal champion] know.

What if I want to leave during the study?
- You do not have to join the study if you do not want to.
- Even if you decide to join, you are free to leave whenever you like. This will not affect your job or your relationship with your employer.
- If you choose to leave, you may choose to include or exclude any information you have given.

What will happen after the interview?

- You may choose to be contacted afterwards to talk about how we understood your story. This will make sure that we write your story the way you want it to be written.
- Any information you give will be kept private in a safe place at the Centre for Oral Health Outcomes & Research Translation (Ingham Institute).
- Only the research team will see your personal information. All your personal details will be kept private.
- The story you share will be used to write research papers. We hope to improve dental care for Aboriginal and Torres Strait Islander pregnant women.
- You will be invited to join an Aboriginal action group to give feedback on the program we plan to develop.

How is the study being paid for?

- By a scholarship through Western Sydney University.
- By South Western Sydney Local Health District (SWSLHD) Aboriginal Health Services.

If you have any questions?

Please contact me if you have any questions and I will be happy to answer them.

[Principal investigator and contact details]

What if I have any complaints?

- This study has been approved by the SWSLHD Human Research Ethics Committee. If you have concerns about the study, please contact:
  The Research and Ethics Office
  Locked Bag 7103
  LIVERPOOL BC NSW 1871
  phone 02 8738 8304 / fax 02 8738 8310 /
  email SWSLHD-Ethics@health.nsw.gov.au
  website: http://www.swslhd.nsw.gov.au/ethics/default.html
  Quote [Local project number]
- The study has also been approved by the Aboriginal Health & Medical Research Council Human Research Ethics Committee. If you have concerns about the study, please contact:
  - AH&MRC Ethics Committee Secretariat
    Aboriginal Health & Medical Research Council of NSW
    PO Box 1565
    Strawberry Hills, NSW 2012
    Telephone No: (02) 9212 4777
    Email: ethics@ahmrc.org.au
    Quote [local project number].

Thank you for taking the time to consider this study.
This information sheet is for you to keep.

Appendix 5: Consent Form – Aboriginal Health Workers

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

I agree to participate in the above named research project.

- I have read and received the information sheet (or have had it read to me).
- The project has been explained to me, and any questions I have about the project have been answered.
- I know I can leave at any time without affecting my job or relationship with my employer.
- Any information gathered from this project may be published. All my personal details will be kept private. I know I cannot be identified from any published material.
- I can contact [name of principal investigator] on telephone [(xx) xxxx xxxx] if I have any other questions.

I also agree to: (Please tick ✓)

☐ Be contacted after the interview by [name of principal investigator] to talk about how my story has been understood and how they will be written. My contact details are:

Phone: ____

E-mail: ____

If you have any concerns/complaints about this study please contact:

Research Governance Officer South Western Sydney Local Health District Human Research Ethics Committee	(02) 8738 8304 SWSLHD-Ethics@health.nsw.gov.au	Quote: [project approval number]
Aboriginal Health & Medical Research Council Ethics Committee	(02) 9212 4777 ethics@ahmrc.org.au	Quote: [project approval number]

Name of Participant (please print) ______________________________

Signature ______________________ Date ______________________

Name of Witness* to Participant's Signature (please print) ______________________________

Signature ______________________ Date ______________________

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Principal Investigator (please print) ______________________________

Signature ______________________ Date ______________________

Master-_Consent-Form_Phase2_AHWs_FocusGroups, version 1.02, dated 19 August12 October 2018 Page 1 of 1

Focus Group Demographic Questions-Aboriginal Health Workers

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

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1. Name:
2. Age:
3. Gender:
4. What educational qualifications have you attained?
5. How long have you worked as an Aboriginal health worker?
6. How long have you worked with pregnant women as an Aboriginal health worker?

Are you an Aboriginal or Torres Strait Islander woman?
Are you pregnant or have a bub less than 1 year old?
Not considered at 'high risk' by your health care provider?
Haven't seen a dentist during your pregnancy?

If you answered 'Yes' to all the above questions

Let's have a yarn

We wish to explore the stories of Aboriginal and Torres Strait Islander pregnant women about their oral health. What you share may make a difference to improve oral health care for Aboriginal women in the future.

Joining is up to you. The information you share will be kept confidential. You are welcome to bring along a support person of your choice for the interview to help you feel more comfortable.

A $50 gift voucher will be given at the end for your time. Light refreshments will also be provided during the interview.

If you would like to join, please contact Ariana on (XX) XXXX XXXX or at (email address). We have limited spaces for research.

This study has been approved by the South Western Sydney Local Health District Human Research Ethics Committee [Approval #], the Aboriginal Health & Medical Research Council Ethics Committee [Approval #] and Western Sydney University Human Research Ethics Committee [Approval #].

MASTER_Appendix1_RecruitmentFlyer_Interviews, version 1.3, 21 February 2019

Appendix 3: Information Sheet for Pregnant Women

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

This study aims to keep women's teeth and gums healthy during pregnancy with the help of Aboriginal health workers. Having a healthy mouth when you're pregnant can help make sure your child will have healthy teeth.

If you would like to join, please read the following and complete the consent form.

What will I be asked to do?

- You will be asked to yarn (tell your story) with a research team member. We will ask about your thoughts about your dental health and how you would like to receive dental care.
- You may also be asked some background information about yourself (e.g. age, other children).
- An Aboriginal health worker will also join the interview if you choose.
- Joining this study is entirely up to you. You do not have to join if you do not want to for any reason.
- You will need to be Aboriginal and/or Torres Strait Islander to join the study.
- You will need to be over 18 years old.

Where will the interview be?

- You may choose where the interview will be. This place will need to be private and quiet.
- The interview will take 30 minutes to 1 hour. This depends on how much you would like to share.
- The interview will be audio recorded.

Will I get anything from joining the study?

- You will be able to share your story.
- Food and drinks will be given during the interview.
- You will receive a $50 gift voucher for your time.

Are there any risks?

- Joining this study should not affect your baby.
- Although unlikely, we can stop at any time if you feel uncomfortable. We can offer you information about support or counselling.

How do I join?

- Please contact Ariana (see page 2 for contact details).
- OR, you may let your Aboriginal health worker give your contact details to Ariana, who will contact you.

What if I want to leave during the study?

- You do not have to join the study if you do not want to.
- Even if you decide to join, you are free to leave whenever you like without affecting the care you receive.
- If you choose to leave, you may choose to include or exclude any information you have given.

What will happen after the interview?

- You may choose to be contacted afterwards to talk about how we understood your story. This will make sure that we write your story the way you want it to be written.
- Any information you give will be kept private in a safe place at the Centre for Oral Health Outcomes & Research Translation (Ingham Institute).
- Only the research team will see your personal information. All your personal details will be kept private.
- The story you share will be used to write research papers. We hope to improve dental care for Aboriginal and Torres Strait Islander pregnant women.
- You will be invited to join an Aboriginal action group to give feedback on the program we plan to develop.

How is the study being paid for?

- By a scholarship through Western Sydney University.
- By South Western Sydney Local Health District (SWSLHD) Aboriginal Health Services.

If you have any questions?

Please contact me if you have any questions and I will be happy to answer them.

Ariana Villarosa (PhD Candidate)
Centre for Oral Health Outcomes & Research Translation (COHORT)
School of Nursing and Midwifery
Western Sydney University
Call me: XX XXXX XXXX
E-mail me: (email address)

What if I have any complaints?

- This study has been approved by the SWSLHD Human Research Ethics Committee. If you have concerns about the study, please contact:

  The Research and Ethics Office
  Locked Bag 7103
  LIVERPOOL BC NSW 1871
  phone 02 8738 8304 / fax 02 8738 8310 / email
  research.support@sswahs.nsw.gov.au
  website: http://www.swslhd.nsw.gov.au/ethics/default.html
  Quote [Local project number]

- The study has also been approved by the Aboriginal Health & Medical Research Council Human Research Ethics Committee. If you have concerns about the study, please contact:
  - AH&MRC Ethics Committee Secretariat
    Aboriginal Health & Medical Research Council of NSW
    PO Box 1565
    Strawberry Hills, NSW 2012
    Telephone No: (02) 9212 4777
    Email: ethics@ahmrc.org.au
    Quote [local project number].

Thank you for taking the time to consider this study.
This information sheet is for you to keep.

Appendix 6: Consent Form – Pregnant Woman

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

I agree to participate in the above named research project.

- I have read and received the information sheet (or have had it read to me).
- The project has been explained to me. All my questions about the project have been answered.
- I know I can leave at any time without affecting the care I will receive.
- Any information gathered from this project may be published. All my personal details will be kept private. I know I cannot be identified from any published material.
- I can contact Ariana Villarosa on (XX) XXXX XXXX if I have any other questions.

I also agree to: (Please tick ✓)

☐ Be contacted after the interview by Ariana to talk about how my stories have been understood and how they will be written. My contact details are:

Phone: ____

E-mail: ____

If you have any concerns/complaints about this study please contact:

South Western Sydney Local Health District Human Research Ethics Committee	(02) 8738 8304 research.support@sswahs.nsw.gov.au	[project approval number]
Aboriginal Health & Medical Research Council Ethics Committee	(02) 9212 4777 ethics@ahmrc.org.au	[project approval number]

Name of Participant (please print) ______________________________________

Signature ___________________________ Date ___________________________

Name of Witness* to Participant's Signature (please print) ______________________________________

Signature ___________________________ Date ___________________________

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

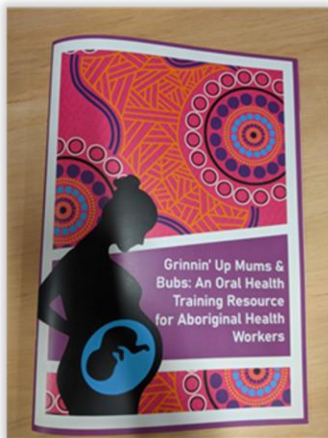
Name of Principal Investigator (please print) ______________________________________

Signature ___________________________ Date ___________________________

Appendix 7: Images of oral health promotion resources

Whiteboard screening tool

Oral health promotion brochure for Aboriginal pregnant women



Training workbook for AHWs (with sample pages)

Oral health promotion magnets for Aboriginal pregnant women

To view a video demonstrating the use of the whiteboard tool, click on this link: https://youtu.be/WZxJp4NHzBw

Appendix 4: Information sheet for [Aboriginal Health Workers/Family Partnership Workers] (Pilot Study)

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

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We would like to pilot a training program that we have developed which aims to train [Aboriginal Health Workers/Family Partnership Workers] to help keep women's teeth and gums healthy during pregnancy. Making sure women have a healthy mouth during pregnancy can help make sure their child will have healthy teeth.

If you would like to join, please read the following and complete the consent form.

What will I be asked to do?

- You will be asked to be involved in the following:

    1. Complete the baseline survey which will ask you questions about your knowledge and confidence about oral health during pregnancy. You may complete the survey on paper, online, over the phone with [interviewer's name]. This will be at a time convenient for you before the training workshop.

    2. Participate in a face-to-face training workshop that will be held at your health service. The training workshop will be facilitated by both Aboriginal and non-Aboriginal people. The training workshop is one-off and will take no longer than 3-4 hours.

    3. Complete the post-training survey which will be identical to the baseline survey, but will include questions for your feedback. This survey will be distributed at the end of the training workshop.

- The surveys will ask some background information about yourself (e.g. date of birth, education, training received).
- Joining this study is entirely up to you. You do not have to join if you do not want to for any reason.
- You will need to be working as an [Aboriginal Health Worker/Family Partnership Worker] to join the study.

Will I get anything from joining the study?

- You will receive training on promoting oral health during pregnancy.
- You will receive some resources that you can use in your practice.
- Food and drinks will be given during the training program.
- Your participation will help us improve the training program, which may be used for other Aboriginal health staff in the future.

Are there any risks?

- It is unlikely you will experience any discomfort during the study.
- If you feel uncomfortable or upset, you are welcome to withdraw at any time.

How do I join?

- If you would like to join the study, please contact [principal investigator].

What if I want to leave during the study?

- You do not have to join the study if you do not want to.
- Even if you decide to join, you are free to leave whenever you like. This will not affect your job or your relationship with your employer.

What will happen after I participate in the study?

- We will use the information from the surveys to improve the training program.
- Findings from this study will be analysed and published in research papers. We hope to improve dental care for Aboriginal and Torres Strait Islander pregnant women.
- If you would like to, we will share with you our findings from this pilot study.
- Any information you give will be kept private in a safe place at the Centre for Oral Health Outcomes & Research Translation (Ingham Institute).
- Only the research team will see your personal information. All your personal details will be kept confidential.

How is the study being paid for?

- By a scholarship through Western Sydney University.
- By South Western Sydney Local Health District (SWSLHD) Aboriginal Health Services.
- By a grant from Maridulu Budyari Gumal

If you have any questions?

Please contact me if you have any questions and I will be happy to answer them.

[Contact details of principal investigator]

What if I have any complaints?

- This study has been approved by the SWSLHD Human Research Ethics Committee. If you have concerns about the study, please contact:

  The Research and Ethics Office
  Locked Bag 7103
  LIVERPOOL BC NSW 1871
  phone 02 8738 8304 / fax 02 8738 8310 /
  email SWSLHD-Ethics@health.nsw.gov.au
  website: http://www.swslhd.nsw.gov.au/ethics/default.html
  Quote [Local project number]
- The study has also been approved by the Aboriginal Health & Medical Research Council Human Research Ethics Committee. If you have concerns about the study, please contact:
  - AH&MRC Ethics Committee Secretariat
    Aboriginal Health & Medical Research Council of NSW
    PO Box 1565
    Strawberry Hills, NSW 2012
    Telephone No: (02) 9212 4777
    Email: ethics@ahmrc.org.au
    Quote [local project number].

Thank you for taking the time to consider this study.
This information sheet is for you to keep.

Appendix 7: Consent Form – Aboriginal health workers (Pilot Test)

Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

I agree to participate in the above named research project.

- I have read and received the information sheet (or have had it read to me).
- The project has been explained to me, and any questions I have about the project have been answered.
- I know I can leave at any time without affecting my job or relationship with my employer.
- Any information gathered from this project may be published. All my personal details will be kept private. I know I cannot be identified from any published material.
- I can contact [name of principal investigator] on telephone [(xx) xxxx xxxx] if I have any other questions.

If you have any concerns/complaints about this study please contact:

Research Governance Officer South Western Sydney Local Health District Human Research Ethics Committee	(02) 8738 8304 SWSLHD-Ethics@health.nsw.gov.au	Quote: [project approval number]
Aboriginal Health & Medical Research Council Ethics Committee	(02) 9212 4777 ethics@ahmrc.org.au	Quote: [project approval number]

Name of Participant (please print) ______________________________

Signature ______________________ Date ______________________

Name of Witness* to Participant's Signature (please print) ______________________________

Signature ______________________ Date ______________________

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Principal Investigator (please print) ______________________________

Signature ______________________ Date ______________________

Baseline (Pre-Training) Survey

Your unique ID (to link pre and post surveys):
Last 3 digits of your mobile number): _ _ _
Date of Birth (DD/MM/YYYY): _ _ / _ _ / _ _ _ _

Grinnin' Up Mums & Bubs

The following questions explore your knowledge and confidence about oral health.

Before you complete this survey, please make sure that you have read the information sheet and have provided consent. Please answer all questions. Most questions require you to select a box to indicate your answer. If you are not sure what the answer is, please select 'Don't know' as we want to know how effective our training program will be in improving your knowledge.

Section 1 – True/False Knowledge Questions

The following questions will explore your knowledge about 1) oral health during pregnancy,
2) current oral health guidelines, 3) accessing dental services, 4) safety of dental treatment and 5) oral health after the baby is born.

Please tick 'True' or 'False' or 'Don't know' for the following questions to the best of your knowledge.

		True	False	Don't Know
1.	The following statements are about **oral health during pregnancy**:			
	Pregnant women are at more risk of getting oral health problems compared to other women.	☐	☐	☐
	Gums can become red and swollen during pregnancy.	☐	☐	☐
	Women should brush teeth after vomiting to avoid wearing down teeth.	☐	☐	☐
	The baby draws calcium out of the mother's teeth during pregnancy.	☐	☐	☐
	Severe gum disease has been linked to:			
	Late delivery of babies	☐	☐	☐
	Low birth weight of babies	☐	☐	☐
	Pregnancy loss	☐	☐	☐

Please tick 'True' or 'False' or 'Don't know' for the following questions to the best of your knowledge.

		True	False	Don't Know
2.	**Based on current pregnancy care guidelines**, all antenatal care providers (including [Aboriginal Health Workers/Family Partnership Workers]) should:			
	Give oral health advice to pregnant women	☐	☐	☐
	Avoid asking pregnant women questions about potential dental problems	☐	☐	☐
	Avoid recommending women to see dental services	☐	☐	☐
	Recommend that every child should see a dentist by the age of one	☐	☐	☐
3.	The following statements relate to **accessing the dentist.**			
	Only adults with Health Care Cards/Pension Cards can access public dental services.	☐	☐	☐
	Pregnant women, who are eligible to go to public dental services, will have to wait longer than 3 months for an appointment.	☐	☐	☐
	Not all children (under 18 years) can access public dental services.	☐	☐	☐
	Some children can receive the Child Benefits Schedule ($1000) from Medicare to go to a private dentist.	☐	☐	☐
4.	The following are **safe** during pregnancy:			
	All antibiotics	☐	☐	☐
	All pain relief medicine	☐	☐	☐
	Most dental treatments	☐	☐	☐
	Dental x-rays	☐	☐	☐
	Local anaesthesia (numbing injections)	☐	☐	☐

	Please tick 'True' or 'False' or 'Don't know' for the following questions to the best of your knowledge.	True	False	Don't Know
5.	The following statements are about **oral health after the baby is born**.			
	Putting a baby to bed with a bottle increases the baby's risk of dental decay.	☐	☐	☐
	Adding fruit juice to the baby's bottle won't increase the baby's risk of dental decay as long as there are 'no added sugars'.	☐	☐	☐
	Adding honey (or another sugar sweetener) to the baby's dummy won't increase the baby's risk of dental decay.	☐	☐	☐
	Sharing a spoon with the baby will not increase the baby's risk of dental decay.	☐	☐	☐

Section 2 - Level of Confidence

How confident are you in discussing good oral health care with a woman during her pregnancy?

Not confident at all — Completely confident

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How confident are you in asking screening questions to identify if a pregnant woman needs to see the dentist?

Not confident at all — Completely confident

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How confident are you in referring clients at risk of poor oral health to dental services?

Not confident at all — Completely confident

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section 3 - General Information About Yourself

1. What is your highest level of education?

- ☐ Primary school
- ☐ High school
- ☐ TAFE/Diploma
- ☐ Bachelor degree
- ☐ Honours
- ☐ Graduate certificate/graduate diploma
- ☐ Masters
- ☐ PhD
- ☐ Other (*Please specify e.g. if you are currently studying*)

____

2. How long (in years) have you been working as an [Aboriginal Health Worker/Family Partnership Worker]? *(If less than 1 year, please advise how many months)*

______________________ years / months *(please circle)*

3. Have you previously received any education or training regarding oral health care for pregnant women in any previous or current role?

- ☐ Yes
- ☐ No

If yes, where did you receive this education or training?

____

Thank you very much for your time

Post-Training Survey

Your unique ID (to link pre and post surveys):
Last 3 digits of your mobile number): _ _ _
Date of Birth (DD/MM/YYYY): _ _ / _ _ / _ _ _ _

Grinnin' Up Mums & Bubs

The following questions explore your knowledge and confidence about oral health.

Before you complete this survey, please make sure that you have read the information sheet and have provided consent. Please answer all questions. Most questions require you to select a box to indicate your answer. If you are not sure what the answer is, please select 'Don't know' as we want to know how effective our training program will be in improving your knowledge.

Section 1 – True/False Knowledge Questions

The following questions will explore your knowledge about 1) oral health during pregnancy,
2) current oral health guidelines, 3) accessing dental services, 4) safety of dental treatment and 5) oral health after the baby is born.

Please tick 'True' or 'False' or 'Don't know' for the following questions to the best of your knowledge.

		True	False	Don't Know
1.	The following statements are about **oral health during pregnancy**:			
	Pregnant women are at more risk of getting oral health problems compared to other women.	☐	☐	☐
	Gums can become red and swollen during pregnancy.	☐	☐	☐
	Women should brush teeth after vomiting to avoid wearing down teeth.	☐	☐	☐
	The baby draws calcium out of the mother's teeth during pregnancy.	☐	☐	☐
	Severe gum disease has been linked to:			
	Late delivery of babies	☐	☐	☐
	Low birth weight of babies	☐	☐	☐
	Pregnancy loss	☐	☐	☐

Please tick ‘True’ or ‘False’ or ‘Don’t know’ for the following questions to the best of your knowledge.				
		True	**False**	**Don’t Know**
2.	**Based on current pregnancy care guidelines**, all antenatal care providers (including [Aboriginal Health Workers/Family Partnership Workers]) should:			
	Give oral health advice to pregnant women	☐	☐	☐
	Avoid asking pregnant women questions about potential dental problems	☐	☐	☐
	Avoid recommending women to see dental services	☐	☐	☐
	Recommend that every child should see a dentist by the age of one	☐	☐	☐
3.	The following statements relate to **accessing the dentist.**			
	Only adults with Health Care Cards/Pension Cards can access public dental services.	☐	☐	☐
	Pregnant women, who are eligible to go to public dental services, will have to wait longer than 3 months for an appointment.	☐	☐	☐
	Not all children (under 18 years) can access public dental services.	☐	☐	☐
	Some children can receive the Child Benefits Schedule ($1000) from Medicare to go to a private dentist.	☐	☐	☐
4.	The following are **safe** during pregnancy:			
	All antibiotics	☐	☐	☐
	All pain relief medicine	☐	☐	☐
	Most dental treatments	☐	☐	☐
	Dental x-rays	☐	☐	☐
	Local anaesthesia (numbing injections)	☐	☐	☐

	Please tick 'True' or 'False' or 'Don't know' for the following questions to the best of your knowledge.	True	False	Don't Know
5.	The following statements are about **oral health after the baby is born.**			
	Putting a baby to bed with a bottle increases the baby's risk of dental decay.	☐	☐	☐
	Adding fruit juice to the baby's bottle won't increase the baby's risk of dental decay as long as there are 'no added sugars'.	☐	☐	☐
	Adding honey (or another sugar sweetener) to the baby's dummy won't increase the baby's risk of dental decay.	☐	☐	☐
	Sharing a spoon with the baby will not increase the baby's risk of dental decay.	☐	☐	☐

Section 2 - Level of Confidence

How confident are you in discussing good oral health care with a woman during her pregnancy?

Not confident at all ☐—☐—☐—☐—☐ Completely confident
1 2 3 4 5

How confident are you in asking screening questions to identify if a pregnant woman needs to see the dentist?

Not confident at all ☐—☐—☐—☐—☐ Completely confident
1 2 3 4 5

How confident are you in referring clients at risk of poor oral health to dental services?

Not confident at all ☐—☐—☐—☐—☐ Completely confident
1 2 3 4 5

Section 3 - Feedback

For each statement below, please choose a number that best represents how you felt after the training (1 = strongly disagree, 7 = strongly agree)

	1. When it comes to the training content:	**Strongly disagree ↓**				**Strongly agree ↓.**
a.	The content was easy to understand	**1**	**2**	**3**	**4**	**5**
b.	The material was relevant to my work	**1**	**2**	**3**	**4**	**5**
c.	The training has given me knowledge to use when I give oral health advice	**1**	**2**	**3**	**4**	**5**
d.	The screening tool is easy to use	**1**	**2**	**3**	**4**	**5**
e.	The referral pathways would be appropriate to use	**1**	**2**	**3**	**4**	**5**
f.	The length of the training was adequate	**1**	**2**	**3**	**4**	**5**
g.	The training met the learning objectives	**1**	**2**	**3**	**4**	**5**
h.	I would recommend this training to other Aboriginal Health Workers/Family Partnership Workers	**1**	**2**	**3**	**4**	**5**
	2. I am satisfied with the quality of the:	**Strongly disagree ↓**				**Strongly agree ↓.**
a.	Presenters	**1**	**2**	**3**	**4**	**5**
b.	PowerPoint	**1**	**2**	**3**	**4**	**5**
c.	Training manual	**1**	**2**	**3**	**4**	**5**
d.	Screening tool	**1**	**2**	**3**	**4**	**5**
e.	Supporting oral health resources (brochure, whiteboard resource, magnet)	**1**	**2**	**3**	**4**	**5**
	3. The following items were culturally appropriate:	**Strongly disagree ↓**				**Strongly agree ↓.**
a.	Training presentation	**1**	**2**	**3**	**4**	**5**
b.	Training manual	**1**	**2**	**3**	**4**	**5**
c.	Screening tool	**1**	**2**	**3**	**4**	**5**
d.	Referral pathways	**1**	**2**	**3**	**4**	**5**
e.	Supporting oral health resources (brochure, whiteboard resource, magnet)	**1**	**2**	**3**	**4**	**5**

4. What did you like about the training?
5. What didn't you like about the training?
6. Do you have any recommendations to improve the program?

Thank you very much for your time

Appendix 11: *Ethical approval letter from AH&MRC Human Research Ethics Committee*

17th December 2018

A/Professor Ajesh George
Centre for Oral Health Outcomes & Research Translation (COHORT)
Level 3
Ingham Institute
1 Campbell Street
LIVERPOOL NSW 2170

AH&MRC Ethics Committee
02 9212 4777
ethics@ahmrc.org.au

Dear A/Professor George,

HREC Reference number: 1438/18
Project title: Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women

Thank you for submitting the above research project for ethical review. This project was considered by the AH&MRC Ethics Committee at its meeting held on 10th December 2018.

I am pleased to advise you that the above research project meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and ethical approval for this research project has been granted by AH&MRC Ethics Committee.

The nominated participating site/s that the AH&MRC HREC have sighted letters of support and/or consent forms for this project is/are approved.

[Note: If additional sites are engaged prior to the commencement of, or during the research project, the Coordinating Principal Investigator is required to notify the AH&MRC HREC. Notification of withdrawn sites should also be provided to the AH&MRC HREC in a timely fashion.

The original documents listed below that were submitted on 26th August 2018 are approved:

Document
1-2. AHMRC Cover Sheet_Criteria
3. HREA_ACV_AG_LR_NJ
3. HREA_MS
3. HREA_RS
3. HREA_SWSLHD_EthicsFULL
4. Appendix 2 MASTER_P2_PIS_AHWs
4. Appendix 3 MASTER_P2_PIS_PregnantWomen

4. Appendix 4 MASTER_P3_PIS_AHWs
4. Appendix 5 MASTER_P2_Consent_AHWs
4. Appendix 6 MASTER_P2_Consent_PregnantWomen
4. Appendix 7 MASTER_P3_Consent_AHWs
4. SWSLHD_Protocol_FINAL
5. MASTER_P2_DemographicQs_FINAL
5. MASTER_Questions_FGs_Interviews
6. Appendix 1 MASTER_RecruitmentFlyer
7. GWAHS_LetterSupport_20180826
7. SWSLHD_LetterSupport_20180826
MtDruitt_ACV_AG
MtDruitt_LR
MtDruitt_MS
MtDruitt_NJ_RS
MtDruitt_NP(Head)
MtDruitt_SSA_FULL
SWSLHD_ACV_AG
SWSLHD_LR
SWSLHD_MS
SWSLHD_RS_NJ
SWSLHD_SSA_FULL

The amended documents listed below that were submitted post-initial submission are approved:

Document
AHMRC_Comments_Revisions_v2
SWSLHD_Protocol_v1.4
181128120301_0001
AboriginalActionGroup_TermsOfReference_FINAL

AHMRC_Comments_Revisions
GWAHS_LetterSupport_Signed
SWSLHD_Protocol_v1.3
HREA_SWSLHD_Ethics_wSignatures
MASTER_P2_PIS2_AHWs_20180819
MASTER_P2_PIS3_PregnantWomen_20180819
MASTER_P3_PIS4_AHWs_20180819
MASTER_Questions_FGs_Interviews_20180816
MASTER_RecruitmentFlyer_20180813
SWSLHD_Protocol_FINAL

[Note: The amended documents supersede the original document version].

Approval of this project from AH&MRC Ethics Committee is valid from 17th December 2018 to 17th December 2019 subject to the following conditions being met:

- The Coordinating Principal Investigator will immediately report anything that might warrant review of ethical approval of the project.
- The Coordinating Principal Investigator will notify the AH&MRC Ethics Committee of any event that requires a modification to the protocol or other project documents and submit any required amendments in accordance with the instructions provided by the HREC. These instructions can be found at www.ahmrc.org.au/ethics .
- The Coordinating Principal Investigator will submit any necessary reports related to the safety of research participants in accordance with AH&MRC Ethics Committee policy and procedures. These instructions can be found at www.ahmrc.org.au/ethics .
- The Coordinating Principal Investigator will report to the AH&MRC Ethics Committee annually in the specified format and notify the HREC when the project is completed at all sites.
- The Coordinating Principal Investigator will notify the AH&MRC Ethics Committee if the project is discontinued at a participating site before the expected completion date, with reasons provided.
- The Coordinating Principal Investigator will notify the AH&MRC Ethics Committee of any plan to extend the duration of the project past the approval period listed above and will submit any associated required documentation. Instructions for obtaining an extension of approval can be found at www.ahmrc.org.au/ethics .
- The Coordinating Principal Investigator will notify the AH&MRC Ethics Committee of his or her inability to continue as Coordinating Principal Investigator including the name of and contact information for a replacement.
- The Coordinating Principle Investigator will submit the final draft report from the research, and any publication or presentation where data or findings are presented, to

the AH&MRC Ethics Committee to be reviewed for compliance with ethical and cultural criteria prior to:

- Any submission for publication; and/or
- Any dissemination of the report

<u>This letter constitutes ethical approval only</u>.

Should you have any queries about the AH&MRC Ethics Committee's consideration of your project please contact Mr Sonny Green. The AH&MRC Ethics Committee Terms of Reference, Standard Operating Procedures, membership and standard forms are available from www.ahmrc.org.au or from the Ethics Coordinator.

The AH&MRC Ethics Committee wishes you every success in your research.

Yours faithfully,

Ms Val Keed
Chairperson
AH&MRC Ethics Committee

Health
South Western Sydney
Local Health District

Research and Ethics Office
Leadership · Quality · Governance
Locked Bag 7103, LIVERPOOL BC, NSW, 1871
Phone: 02 8738 8304
Facsimile: 02 8738 8310
https://www.swslhd.health.nsw.gov.au/ethics/default.html

South Western Sydney Local Health District acknowledges the traditional owners of this land.

25 October 2018

Ms Ariana Villarosa
Centre for Oral Health Outcomes & Research Translation
Level 3, Ingham Institute
1 Campbell Street
LIVERPOOL NSW 2170

*****THIS LETTER CONSTITUTES ETHICAL APPROVAL ONLY. THIS RESEARCH PROJECT MUST NOT COMMENCE AT A SITE UNTIL SEPARATE AUTHORISATION FROM THE CHIEF EXECUTIVE OR DELEGATE OF THAT SITE HAS BEEN OBTAINED. ******

Dear Ms Villarosa,

Project Title: **Capacity Building Aboriginal Health Workers in Oral Health Promotion: A New Model of Care for Indigenous Pregnant Women**
HREC Reference: **HREC/18/LPOOL/363**
Local Project Number: **HE18/238**

Thank you for your response dated 16 October 2018 to our request for further information dated 17 September 2018. This Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Research Involving Humans* and the *CPMP/ICH Note for Guidance on Good Clinical Practice*.

I am pleased to advise that the Committee has granted ethical approval of the above project.

The following documentation has been reviewed and approved:

Document	Version	Date
Human Research Ethics Application	AU/1/615839	19.08.2018
Protocol	1.2	12.10.2018
MASTER Participant Information Sheet for Aboriginal Health Workers	1.2	12.10.2018
MASTER Participant Information Sheet for Pregnant Women	1.2	12.10.2018
MASTER Participant Information Sheet for Aboriginal Health Workers (Pilot Study)	1.2	12.10.2018
MASTER Consent Form - Aboriginal Health Workers	1.2	12.10.2018
MASTER Consent - Pregnant Women	1.2	12.10.2018
MASTER Consent – Aboriginal Health Workers (Pilot Test)	1.2	12.10.2018
MASTER Interview Questions – both Aboriginal Health Workers and Pregnant Women	1.0	19.08.2018
MASTER Recruitment Flyer	1.2	12.10.2018
MASTER Demographic Questions – Aboriginal Health Workers	1.0	19.08.2018

Please ensure for all future documents submitted for review include a document version number, document date and page numbering.

Monitoring Requirements:

(National Statement Chapters 2.1 and 5.5)

- The Committee has classified this project as:

Low Risk

- Monitoring required for this study will be:
  - Submission of Annual Progress Reports with the first report due **25 October 2019 and annually thereafter for the duration of the approval period**

Approval has been granted for the following site(s):

- South Western Sydney Local Health District

Please note the following conditions of approval:

1. The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
   - any serious or unexpected adverse events; and
   - unforeseen events that might affect continued ethical acceptability of the project.

2. The Principal Investigator will report proposed changes to the research protocol, conduct of the research, or length of HREC approval to the HREC in the specified format, for review. For multi-centre studies, the Chief Investigator should submit to the Lead HREC and then send the amendment approval letter to the investigators at each sites so that they can notify their Research Governance Officer.

3. The Principal Investigator will inform the HREC, giving reasons, if the project is discontinued before the expected date of completion.

4. The Principal Investigator will provide an annual report to the HREC and at completion of the study in the specified format.

5. The Principal Investigator must reassure participants about confidentiality of the data.

6. Proposed changes to the personnel involved in the study are submitted to the HREC accompanied by a CV where applicable.

7. The Principal Investigator is responsible for ensuring the research project is conducted in line with relevant NSW Health, South Western Sydney Local Health District and Hospital policies available from: https://www.swslhd.health.nsw.gov.au/ethics/default.html

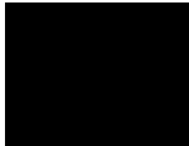
HREC approval is valid for (5) years. If the study is ongoing at the conclusion of the five year approval period, a full resubmission may be required. Ethics approval will continue during the re-approval process.

The South Western Sydney Local Health District Human Research Ethics Committee has been accredited by the NSW Ministry of Health to provide single ethical and scientific review of research proposals conducted within the NSW public health system and Victorian and Queensland Public Health Organisations participating in the Mutual Acceptance Scheme.

You are reminded that this letter constitutes ethical approval only. This research project must not commence at a site until separate authorisation from the Chief Executive or delegate of that site has been obtained. It is your responsibility to forward a copy of this letter together with any approved documents as enumerated above, to all site investigators for submission to the site's Research Governance Officer.

Should you have any queries about your project please contact **Jessica Grundy** on the telephone number 8738 8304. The HREC Terms of Reference, Standard Operating Procedures, membership and standard forms are available from the SWSLHD website: *https://www.swslhd.health.nsw.gov.au/ethics/default.html*

Please quote the Local HREC reference **HE18/238** in all correspondence. The HREC wishes you every success in your research.



Jessica Grundy
on behalf of
Professor Jeremy Wilson
Chairperson, SWSLHD Human Research Ethics Committee

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007).* The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council.

WESTERN SYDNEY
UNIVERSITY

REDI Reference: RH13086

HUMAN RESEARCH ETHICS COMMITTEE

9 January 2019

Associate Professor Ajesh George
School of Nursing and Midwifery

Dear Ajesh,

I wish to formally advise you that the Human Research Ethics Committee has noted the external HREC approval of your research titled: "Capacity building Aboriginal health workers in oral health promotion: A new model of care for pregnant women" under the Western Sydney University number RH13086.

Lead HREC Details

Name of HREC: South Western Sydney Local Health District Research and Ethics Office; Approval Number: HE18/238

Name of HREC: Aboriginal Health and Medical Research Council; Approval Number: 1438/18

Date of Approval for both: 17 December 2018

Conditions of Approval

1. Please advise Western Sydney University HREC of amendments approved by the Administering HREC.
2. Please advise Western Sydney University HREC of any serious or unexpected adverse events reported to the Administering HREC
3. As the Administering HREC has approved the protocol until 9 January 2024 the Western Sydney University record will close after that date unless we are advised that the Administering HREC has approved an extension.

Please quote the registration number and title as indicated above in the subject line on all future correspondence related to this project. All correspondence should be sent to humanethics@westernsydney.edu.au as this email address is closely monitored.

Regards

Human Ethics Officer on behalf of Western Sydney University HREC
humanethics@westernsydney.edu.au

Western Sydney University
ABN 53 014 069 881 CRICOS Provider No. 00917K
Locked Bag 1797 Penrith NSW 2751 Australia
westernsydney.edu.au

Statement of authors' contributions

This thesis is presented as a series of five publications. All jointly published manuscripts contained within this thesis were undertaken with the permission of the co-authors.

The authors have contributed in different aspects on the publications included within the thesis. Contribution to the publications by the main author and co-authors is presented in the proceeding pages.

Paper 1

Kong AC, Ramjan L, Sousa MS, Gwynne K, Goulding J, Jones N, Srinivas R, Rambaldini B, Moir R, George A. The oral health of Indigenous pregnant women: A mixed-methods systematic review. Women and Birth. 2020;33(4):311-22.

Contribution: Study conception/design (AK, AG), data collection (AK, AG, LR, MSS), analysis/interpretation (AK, AG, LR, MSS, JG, NJ, RS, KG, BR, RM), manuscript preparation (AK), critical revision of the manuscript for important intellectual content (AK, AG, LR, MSS, KG), Aboriginal cultural expertise (JG, NJ, BR), manuscript approval (all authors).

Ariana Kong ....

Lucie Ramjan ....

Mariana S. Sousa ....

Kylie Gwynne ....

Joanne Goulding ....

Nathan Jones ....

Ravi Srinivas ....

Boe Rambaldini ....

Rachael Moir ....

Ajesh George ....

Paper 2

Villarosa AC, Villarosa AR, Salamonson Y, Ramjan LM, Sousa MS, Srinivas R, Jones N, George A. The role of indigenous health workers in promoting oral health during pregnancy: a scoping review. BMC Public Health. 2018;18(1):381.

Contribution: Study conception/design (AK, AG), data collection (AK, AG, AV), analysis/interpretation (AK, AG, LR, MSS, NJ, RS, AV, YS), manuscript preparation (AK), critical revision of the manuscript for important intellectual content (AK, AG, LR, MSS, NJ, RS, AV, YS), Aboriginal cultural expertise (NJ), manuscript approval (all authors).

Ariana Kong (née Villarosa) ……………………………………………

Amy Villarosa ……………………………………………

Yenna Salamonson ……………………………………………

Lucie M. Ramjan ……………………………………………

Mariana S. Sousa ……………………………………………

Ravi Srinivas ……………………………………………

Nathan Jones ……………………………………………

Ajesh George ……………………………………………

Paper 3

Kong AC, Sousa MS, Ramjan L, Dickson M, Goulding J, Gwynne K, Talbot F, Jones N, Srinivas R, George A. "Got to build that trust": the perspectives and experiences of Aboriginal health staff on maternal oral health. Int J Equity Health. 2020;19(1):187.

Contribution: Study conception/design (AK, AG, LR, MSS, JG, NJ, RS, KG), data collection (AK, LR, JG), analysis/interpretation (AK, AG, LR, MSS, MD, JG, KG, FT), manuscript preparation (AK), critical revision of the manuscript for important intellectual content (AK, AG, LR, MSS, MD, JG, KG), Aboriginal cultural expertise (MD, JG, NJ, FT), manuscript approval (all authors).

Ariana Kong ....

Mariana S. Sousa ....

Lucie Ramjan ....

Michelle Dickson ....

Joanne Goulding ....

Kylie Gwynne ....

Folau Talbot ....

Nathan Jones ....

Ravi Srinivas ....

Ajesh George ....

Paper 4

Kong A, Dickson M, Ramjan L, Sousa MS, Goulding J, Chao J, George A. A Qualitative Study Exploring the Experiences and Perspectives of Australian Aboriginal Women on Oral Health during Pregnancy. International Journal of Environmental Research and Public Health. 2021;18(15):8061.

Contribution: Study conception/design (AK, AG, LR, MSS, MD, JG, JC), data collection (AK), analysis/interpretation (AK, AG, LR, MSS, MD, JG, JC), manuscript preparation (AK), critical revision of the manuscript for important intellectual content (AK, AG, LR, MSS, MD, JG, JC), Aboriginal cultural expertise (MD, JG, JC), manuscript approval (all authors).

Ariana Kong ……………………………………………………

Michelle Dickson ……………………………………………………

Lucie Ramjan ……………………………………………………

Mariana S. Sousa ……………………………………………………

Joanne Goulding ……………………………………………………

Jemma Chao ……………………………………………………

Ajesh George ……………………………………………………

Paper 5

Kong A, Dickson M, Ramjan L, Sousa MS, Jones N, Srinivas R, Chao J, Goulding J, George A. Aboriginal Health Workers Promoting Oral Health among Aboriginal and Torres Strait Islander Women during Pregnancy: Development and Pilot Testing of the Grinnin' Up Mums & Bubs Program. International Journal of Environmental Research and Public Health. 2021;18(18):9576.

Contribution: Study conception/design (AK, AG, LR, MSS, MD, JG, NJ, RS, JC), data collection (AK, AG, LR, MSS, MD, JG, JC), analysis/interpretation (AK, AG, LR), manuscript preparation (AK, AG, MD), critical revision of the manuscript for important intellectual content (AK, AG, LR, MSS, MD, JG, NJ, RS, JC), Aboriginal cultural expertise (MD, JG, NJ, JC), manuscript approval (all authors).

Ariana Kong ....

Michelle Dickson ....

Lucie Ramjan ....

Mariana S. Sousa ....

Nathan Jones ....

Ravi Srinivas ....

Jemma Chao ....

Joanne Goulding ....

Ajesh George ....