COMPARING MODELS OF HEALTHCARE TO ENSURE ALL CHILDREN ARE BORN HEALTHY AND STRONG

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Bachelor of Business (Economics) with Distinction

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Submitted in partial fulfilment of the requirements for the degree of
Bachelor of Business (Honours) (Economics)

School of Economics & Finance
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Queensland University of Technology

2021

Keywords

Aboriginal Health Services (AHSs), Closing the Gap (CTG), culturally appropriate care, health disparities, health inequalities, Indigenous Australians, infant mortality, low birthweight, Mainstream Health Services (MHSs), maternal mortality, maternal behaviours, non-Indigenous Australians, preterm birth.

Abstract

Aboriginal and Torres Strait Islanders Peoples – hereafter referred to by their collective term Indigenous Australians – are disproportionately impacted by socio-economic and health problems compared to non-Indigenous Australians. Despite evidence of the gaps between Indigenous and non-Indigenous Australians in numerous indicators and the implementation of government policies to address these gaps, over time little has been achieved to improve the situation for Indigenous Australians. This can partly be attributed to a lack of understanding about the causes of and solutions to the disparities between Indigenous and non-Indigenous Australians.

Within the field of health, Indigenous Australians not only have worse outcomes compared to their non-Indigenous Australian counterparts but also other indigenous peoples around the world. This is due to Indigenous Australians having much lower life expectancies but much higher mortalities – including higher rates of maternal and child mortality. The literature highlights the importance of culturally appropriate care and Indigenous-specific health services to improve Indigenous Australians' maternal and child health outcomes. In theory, Indigenous-Specific Primary Health Care Services (ISPHCS) and Aboriginal Community Controlled Health Services (ACCHSs) are more suited to treat the needs of Indigenous Australians and are thus more valued by Indigenous Australians, resulting in higher uptake of these services and therefore improving their health outcomes. However, there are only small-scale, localised studies with evidence of these services having better clinical outcomes. This thesis, therefore, uses the Longitudinal Study of Indigenous Children (LSIC) to identify whether Indigenous Australians have better maternal and child health outcomes when they utilise Aboriginal Health Services (AHSs) as opposed to Mainstream Health Services (MHSs). The results indicate that Indigenous Australians do not have better clinical outcomes when they utilise AHSs as opposed to MHSs. As such, further research needs to be undertaken to understand why some indigenous-specific services have better clinical outcomes for indigenous peoples whilst others do not. Such research is necessary to ensure these culturally appropriate services are providing care that can materialise into the best possible improvements in Indigenous Australians' health.

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List of Abbreviations

ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Service
AHMAC	Australian Health Ministers' Advisory Council
AHS	Aboriginal Health Service
AIHW	Australian Institute of Health and Welfare
AMIC	Aboriginal Maternal and Infant Care
AOR	Adjusted Odds Ratio
ASGC-RA	Australian Statistical Geographical Classification – Remoteness Area
BiOC	Birthing in Our Community
CAEPR	Centre for Aboriginal Economic Policy Research
CI	Confidence Interval
COAG	Council of Australian Governments
CTG	Closing the Gap
DEC	Departmental Ethics Committee
DoH	Department of Health
FaHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs
HREC	Human Research Ethics Committee
ISPHCS	Indigenous-Specific Primary Health Care Service
IWGIA	International Work Group for Indigenous Affairs
LORI	Level of Relative Isolation
LSIC	Longitudinal Study of Indigenous Children
MHS	Mainstream Health Service
MMR	Maternal Mortality Ratio
NHMRC	National Health and Medical Research Council
NAIDOC	National Aboriginal and Islander Observance Committee
NIRA	National Indigenous Reform Agreement
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
PM&C	Department of the Prime Minister and Cabinet
SCRGSP	Steering Committee for the Review of Government Service Provision
SEIFA	Socio-Economic Indexes For Areas
UN	United Nations

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

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Date: 11/12/2021

Acknowledgements

First and foremost, I would like to take this opportunity to acknowledge the Traditional Custodians of the land and pay my respect to Elders past, present, and future.

I would also like to take this opportunity to express my gratitude to everyone who was involved in the completion of this dissertation from its humble beginning to its conclusion.

Firstly, I would like to thank my supervisor Professor Uwe Dulleck. I am grateful that with Uwe as my supervisor I was able to undertake a meaningful research project.

I would like to thank my family and friends for their support, encouragement, and putting up with my complaints when things did not go as planned. A special thanks to my mum – Mother Theresa (my saint) – for reading sections of my thesis, asking me questions that made me critically reflect on my work, and also picking up on little errors that I missed. I must also thank my younger sister, Erin, whom I bullied into reading sections of my thesis.

Lastly, this paper uses unit record data from Footprints in Time: the Longitudinal Study of Indigenous Children (LSIC) – DOI:10.26193/ICEBFP, conducted by the Australian Government Department of Social Services (DSS). The findings and views reported in this paper, however, are those of the author and should not be attributed to the Australian Government, DSS, or any of DSS' contractors or partners.

Chapter 1: Introduction

This chapter outlines the background (section 1.1) and context (section 1.2) of the research as well as its purpose and significance (section 1.3). Finally, section 1.4 includes an outline of the remaining chapters of this thesis.

1.1 BACKGROUND

Indigenous peoples have a special connection to their traditional lands and retain social, cultural, economic, and political characteristics which are distinct from those of the dominant societies in which they live (United Nations (UN), 2021). Despite vast differences between the diverse indigenous peoples, they face common difficulties that are the result of historical injustices, including colonisation, dispossession of land, oppression, discrimination, as well as a lack of control over their own ways of life (UN, 2018). As such, despite indigenous peoples accounting for approximately five per cent of the global population, they account for around 15 per cent of those living in extreme poverty (International Work Group for Indigenous Affairs (IWGIA), 2020). In light of this, over the past several decades, indigenous peoples' rights have become an important component of international law and policy (The World Bank, 2021). In 2007, the UN General Assembly adopted the United Nations' Declaration on the Rights of Indigenous Peoples (the Declaration), which applied rights to indigenous peoples and their specific situations and thereby reversed their historical exclusion from the international legal system. By 2010, the Declaration was supported by the vast majority of UN Member States and opposed by none (UN Office of the High Commissioner for Human Rights, 2013).

Indigenous Australians are a key example of indigenous peoples that continue to suffer the consequences of historical injustice. Since comparable statistics became available in the 1971 national Census[1], the extent of Indigenous Australians' disadvantage has been demonstrated using socio-economic indicators (Altman & Nieuwenhuysen, 1979). As exhibited in Table 1.1, there are clear disparities between Indigenous and non-Indigenous Australians in areas such as health, education, and employment. These issues are interconnected and the

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[1] In the 1967 Referendum 90.77 per cent of the Australian population voted in favour of amending sections 51 and 127 of the Constitution, which would enable the Commonwealth Parliament to make laws with respect to Indigenous Australians and include them in the national Census. The legislation was passed unanimously (Thomas, 2017). This meant that the 1971 national Census was the first in which Indigenous Australians were included.

underlying and intergenerational causes of the disparities between Indigenous and non-Indigenous Australians are not easily addressed, hence it has been referred to as a wicked problem[2] (Department of the Prime Minister and Cabinet (PM&C), 2018a). Therefore, despite the implementation of policies by numerous governments over time, little progress has been made to improve the situation for Indigenous Australians.

Table 1.1 Key Socio-economic Indicators for Indigenous and Non-Indigenous Australians

Indicator	**Indigenous Australians**	**Non-Indigenous Australians**
Life expectancy (females)	75.6 years	83.4 years
Life expectancy (males)	71.6 years	80.2 years
Child mortality (deaths per 100,000)	141/100,000	67/100,000
Healthy birthweight	88.9%	94%
Enrolled in early childhood education (the year before full-time schooling)	93.1%	84.2%
Year 12 (or equivalent) attainment	63.2%	88.5%
Hold a post-school tertiary qualification	42.3%	72.0%
Employment rate	51.0%	75.7%

(Australian Government, 2021)

For the past decade, the Closing the Gap (CTG) framework was the Australian Government's policy for addressing "Indigenous disadvantage" (Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA), 2009a, p. 5). Originally 'closing the gap' was a term used in the National Indigenous Health Equality Campaign, which

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[2] A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems (Webb, 2016).

aimed to address the 17-year gap in life expectancy between Indigenous and non-Indigenous Australians that was highlighted in the 2005 Social Justice Report (Calma, 2005). In April 2007, the CTG Campaign was launched by Indigenous Australian health, non-governmental, and human rights organisations and by December 2007 the Council of Australian Governments (COAG) committed to closing the life expectancy gap between Indigenous and non-Indigenous Australians (Australian Indigenous HealthInfoNet, 2021). In November 2008, COAG approved the National Indigenous Reform Agreement (NIRA) which set out six, and later seven, CTG targets (Gardiner-Garden, 2012). According to the 2009 CTG Report, the Australian Government "set specific and ambitious targets to address Indigenous disadvantage" (FaHCSIA, 2009a, p. 5). Although the targets were amended over time, as per the latest CTG report they were as follows:

1. Halve the gap in mortality rates for Indigenous children under five within a decade (by 2018)
2. 95 per cent of all Indigenous four-year-olds enrolled in early childhood education by 2025
3. Close the gap between Indigenous and non-Indigenous school attendance within five years (by 2018)
4. Halve the gap for Indigenous children in reading, writing and numeracy within a decade (by 2018)
5. Halve the gap for Indigenous Australians aged 20–24 in Year 12 attainment or equivalent (by 2020)
6. Halve the gap in employment outcomes between Indigenous and non-Indigenous Australians within a decade (by 2018)
7. Close the life expectancy gap within a generation (by 2031)

(Australian Government, 2020a)

Four of the targets expired in 2018 and none of these targets were met. Firstly, the child mortality rates for both Indigenous and non-Indigenous Australians improved; however, there was a greater improvement for non-Indigenous Australians so the gap widened and the target was not met. Again, despite improvements in Indigenous Australians' foundational skills – reading, writing, and numeracy – this target was not met. Since there was little to no improvement in school attendance and employment rates for Indigenous Australians, these targets were also not met. The target to halve the gap in Year 12 or equivalent attainment rates expired in 2020 and based on 2019 data – the most recently available data – this target was on track to be met. Of the two ongoing targets, enrolment in early childhood education is on track to be met by 2025 but closing the life expectancy gap by 2031 is not on track to be met (Australian Government, 2020a).

Given the expiration of a majority of the CTG targets and the fact that the Australian Government's approach was widely critiqued, a new framework has been implemented "with its focus on new ways of doing things" (Australian Government, 2021, p. 2). In March 2019, Prime Minister Scott Morrison entered into a Partnership Agreement on Closing the Gap, a landmark agreement between all Australian Governments and the Coalition of Aboriginal and Torres Strait Islander Peak Organisations (Coalition of Peaks) to develop the National Agreement on Closing the Gap (the Agreement). The Agreement, published in July 2020, was developed with priorities and tangible percentage-based targets that all Australian Governments and the Coalition of Peaks could commit to achieving. Additionally, the framework focusses on establishing meaningful partnerships and engaging with the expertise of Indigenous Australians to guide action and change (Australian Government, 2020b). The Agreement has 17 socio-economic targets that are important to the wellbeing of Indigenous Australians and will be monitored and discussed in an annual report (Australian Government, 2021).

1.2 CONTEXT

Although Indigenous Australians experience numerous socio-economic disparities compared to non-Indigenous Australians, health is one area in which they are particularly burdened. Indigenous Australians have lower life expectancies, higher mortality rates – particularly maternal and child mortality – a higher burden of disease, and worse clinical outcomes than non-Indigenous Australians (Australian Government, 2020a). It is clear that the Australian Government has an obligation to address these health disparities, however, for Indigenous Australians:

> "The benefits in closing these gaps go beyond fulfilling a policy agenda, providing new health services, or establishing new programs. It means future generations of Indigenous Australians who live longer, who thrive rather than survive, and who are recognised as valued members of the society and country they own" (Milroy & Bandler, 2021, p. 209).

Given the importance of improving Indigenous Australians' health, this thesis will focus on the maternal and child health outcomes of Indigenous Australians. Although Australia's maternity care is among the safest in the world, Indigenous Australian women and children experience a significant disadvantage in health outcomes, compared to non-Indigenous Australians, which can have significant life-long implications (AIHW, 2021a; Commonwealth of Australia, 2011; Sivertsen et al., 2020). The literature highlights the importance of culturally appropriate care and Indigenous-specific health services to improve maternal and child health. In theory, Indigenous-Specific Primary Health Care Services (ISPHCS) and Aboriginal Community Controlled Health Services (ACCHSs) are more suited to treat the needs of Indigenous Australians and are thus more valued by Indigenous Australians, resulting in higher uptake of these services and therefore improving their health outcomes (Allen et al., 2020; Kelly et al., 2014; Mackey et al., 2014; Middleton et al., 2017; Steering Committee for the Review of Government Service Provision (SCRGSP), 2020). However, it is unclear whether these services result in better clinical outcomes. Although it is important that Indigenous Australians are able to access culturally appropriate health services, from a health economics perspective it is just as important that scarce resources are being used to improve the health of the Indigenous Australian population (Angell, 2017).

1.3 PURPOSE AND SIGNIFICANCE

This thesis aims to address one of the biggest gaps that exists in the literature by identifying whether, given the available data, Indigenous Australians have better maternal and child health outcomes when they utilise Aboriginal Health Services (AHSs) as opposed to Mainstream Health Services (MHSs).

The purpose of this thesis is not to use the results to argue whether or not AHSs, and more broadly ACCHSs or ISPHCSs, should be funded or even exist. The theory is clear, these services are better suited to address the needs of Indigenous Australians. However, it is not clear whether this materialises into better clinical outcomes. Therefore, this thesis aims to be a preliminary study to firstly determine how AHSs perform, compared to MHSs, in treating Indigenous Australians. The results should then be used to determine what further research is needed to ensure these culturally appropriate services are providing care that can materialise into the best possible improvements in Indigenous Australians' health.

As such, this thesis will add to the existing literature on strategies to close the gap in maternal and child health outcomes in Australia. However, this thesis is not able to address all of the gaps which exist in the literature. More extensive evidence on the strategies which are effective in improving health outcomes among Indigenous Australian families is urgently needed to inform policy, practice, and funding decisions (Kildea et al., 2021).

1.4 THESIS OUTLINE

Chapter 2 is a review of the literature surrounding the inequality between Indigenous and non-Indigenous Australians. The chapter starts by discussing the health gap between Indigenous and non-Indigenous Australians, the health status of Indigenous Australians, and the determinants of Indigenous Australians' health as identified in the literature. Next, the chapter reviews the literature on Indigenous Australians' maternal and infant health outcomes, the factors contributing to worse outcomes in these areas, and the recommendations in the literature to improve outcomes. Chapter 2 then concludes by discussing the limitations and gaps in the literature as well as the implications of these limitations for this study.

Chapter 3 starts by discussing the dataset used, the variables used, the hypothesis being tested, and finishes with a discussion of the statistical analysis undertaken.

Chapter 4 includes the results of the study based on the primary outcomes that were defined prior to analysis. The chapter starts with the results on pregnancy check-ups, followed by maternal behaviours during pregnancy, birth outcomes, and then concludes by revealing the results as to whether the study children were breastfed.

Chapter 5 contains a full discussion, interpretation and evaluation of the primary outcomes that are included in the results section, with reference to the literature.

Chapter 6 starts with a brief summary and overview of the thesis, it then discusses the main findings based on the primary outcomes, next the limitations are discussed, and this is followed by the recommendations for future research.

Chapter 2: Literature Review

This chapter discusses the literature regarding the disparity between Indigenous and non-Indigenous Australians within the field of health, to determine what has been learnt thus far and what remains to be learnt.

Firstly, section 2.1 reviews the literature on the health gap between Indigenous and non-Indigenous Australians, by discussing key statistics as well as the key determinants of Indigenous Australians' health as identified in the literature.

Section 2.2 reviews the literature on Indigenous Australians' maternal and infant health outcomes, the factors contributing to worse outcomes in these areas, and the recommendations in the literature to improve outcomes.

Lastly, section 2.3 discusses the gaps in the literature followed by section 2.4 which summarises and discusses the implications of these gaps for this study.

2.1 INDIGENOUS AUSTRALIANS' HEALTH

The burden of disease for Indigenous Australians is, on average, 2.3 times greater than non-Indigenous Australians (Australian Institute of Health and Welfare (AIHW, 2020a). However, Indigenous Australians not only have worse health outcomes compared to non-Indigenous Australians, but they also have worse health outcomes than comparable indigenous populations in Canada, the United States, and New Zealand (Ring & Brown, 2002). This suggests that there are underlying factors that have a greater impact on the health of Indigenous Australians (Booth & Carroll, 2005).

2.1.1 Indigenous Australians and Their Health Status

Life Expectancy

The target to "Close the Gap in life expectancy within a generation, by 2031" was one of the original CTG targets and remains a target in the new agreement (Australian Government, 2020a, p. 22). However, it is widely accepted in the literature that the target is not on track to be met (Altman et al., 2009; Australian Government, 2020a; PM&C, 2019). Between 2015 and 2017, life expectancy at birth was 71.6 years for Indigenous Australian males and 80.2 years for non-Indigenous Australian males, a gap of 8.6 years. Life expectancy at birth was 75.6 years for Indigenous Australian females and 83.4 years for non-Indigenous Australian females, a gap of 7.8 years (Australian Bureau of Statistics (ABS), 2018a). Furthermore, for Indigenous Australians, life expectancy decreases as remoteness increases but this is not the case for the rest of the population (ABS, 2018b).

Although life expectancy is considered one of the best and widely used measures of health, there are numerous concerns highlighted throughout the literature. Firstly, it measures the length of life but does not capture the quality of life (Altman et al., 2009; ABS, 2018b). Another problem is that despite being the primary measure of health, data on life expectancy is only published every five years with the availability of the Census data (SCRGSP, 2020; Australian Government, 2020a). Furthermore, disaggregated analyses can provide better insights but estimates of life expectancy can only be reported at the jurisdictional level for New South Wales (NSW), Queensland (Qld), Western Australia (WA), and the Northern Territory (NT), given the other states and territory are subject to limitations imposed due to the relatively small numbers of Indigenous Australians in these jurisdictions (Australian Government, 2019; SCRGSP, 2020).

Mortality Rates

Due to life expectancy data only being available every five years, age-standardised mortality rates have also been used to track progress against the life expectancy target (Australian Government, 2020a). Between 2006 and 2018, Indigenous Australian age-standardised mortality rates improved by almost 10 per cent. However, non-Indigenous Australian rates improved at a similar rate, so the gap has not narrowed. As such, the Indigenous Australian mortality rate has not been on track to meet the life expectancy target since 2011 (ABS, 2019a).

Indigenous Australians’ Understanding of Health

The literature acknowledges that indicators of Indigenous Australian health are derived from the ABS’ census questions, which reflect the norms of the dominant mainstream society and are not reflective of Indigenous Australians’ perceptions of health (Altman et al, 2009; Andrews, 2012). While non-Indigenous Australians perceive health in terms of physical and mental wellbeing; Indigenous Australians’ understanding of health is more holistic and involves being physically, spiritually and emotionally well, and connected with family, community, culture, language, and Country (AIHW, 2018a; Butler et al., 2019; Gee et al., 2014). It has thus been suggested that using socially acceptable and culturally appropriate survey techniques are necessary to obtain the true perception of Indigenous Australians’ health (Andrews, 2012).

2.1.2 Determinants of Indigenous Australians’ Health

Health outcomes are fundamentally the result of underlying structural factors such as access to health care, socio-economic conditions, behavioural risk factors, culture, and colonisation. If the Australian Government wants to improve and sustain the health of Indigenous Australians over time, these elements must be addressed (Meehan & Wright, 2018).

Health Services

Although the health system in isolation cannot address all the complex and intersecting risk factors associated with Indigenous Australians’ health, it is generally accepted that having greater access to and higher utilisation of health services will increase life expectancy (AIHW, 2019a; Department of Health (DoH), 2016; Korda et al., 2007; SCRGSP, 2020). However, the literature identifies that, in many cases, Indigenous Australians have lower access to health services than non-Indigenous Australians (AIHW, 2020b). This is because they face barriers when accessing health services such as a lack of accessible, responsive, and culturally appropriate services near where they live as well as the ability to afford these services (AIHW, 2020b: SCRGSP, 2020). Between 2018 and 2019, one in five Indigenous Australians did not go to the doctor when needed, with 53 per cent of those quoting personal reasons such as discrimination and services not being culturally safe or adequate (SCRGSP, 2020). Another indicator of the quality, effectiveness, and accessibility of the health system is the rate of potentially avoidable deaths (AIHW, 2020b). Between 2014 and 2018, 60 per cent of Indigenous Australian deaths in NSW, Qld, WA, and NT were potentially avoidable, meaning the condition from which they died was potentially preventable or treatable with access to timely and effective health care (SCRGSP, 2020).

Health services are also limited in their ability to close the gap since health expenditure for Indigenous Australians does not reflect their relative need for health services, as expenditure should be proportionate to their health burden but this is not the case in Australia (AIHW, 2020b; Braveman & Gruskin, 2003; Whitehead, 1991).

Social Determinants and Personal Risk Factors

Health and wellbeing are influenced by social determinants – the circumstances in which people grow, live, work, and age – as well as individual risk factors (AIHW, 2020b; Commission on Social Determinants of Health, 2008; Cooper, 2011). Empirical studies have generally found a strong association between social determinants and health status

(Lahelma et al., 2004; Wilkinson & Marmot, 1998). In Australia, social determinants account for 34 per cent of the health gap between Indigenous and non-Indigenous Australians, with the literature identifying the main social determinants as employment and income, housing, and personal risk factors (Australian Health Ministers' Advisory Council (AHMAC), 2017). The literature concurs that improving these social determinants can improve healthy behaviours, health care use and, subsequently, life expectancy (AHMAC, 2015; AIHW, 2015a; Cairney et al., 2017).

The positive link between employment, the resultant income, and health is generally acknowledged and accepted in the literature (Lowry & Moskos, 2004). An adequate income is fundamental to being able to live a healthy life, since it gives a person greater access to better quality food and housing as well as access to services which may directly improve health – such as health services – or indirectly improve health – such as education (Galobardes et al., 2006; Lowry & Moskos, 2004; Wilkinson & Marmot, 1998). The association between income and health works in both directions since an adequate income supports better health whereas poor health can make it difficult to gain employment and earn an income (AIHW, 2020b). In 2016, an estimated 37 per cent of Indigenous Australians aged 15 and over had adjusted weekly household incomes in the bottom 20 per cent of the income distribution for all Australians aged 15 and over (AIHW, 2019b).

Adequate housing – that is, housing that provides space for all members of the household and is in good structural condition with adequate working facilities – was identified in the literature as another important social determinant of Indigenous Australians' health (AIHW, 2020a, 2020b; Bailie et al., 2005; Phibbs & Thompson, 2011; Ware, 2013). Compared with non-Indigenous Australians, Indigenous Australians have less access to adequate, affordable or secure housing and are more likely to live in overcrowded conditions or experience homelessness (AIHW, 2020a). Between 2018 and 2019, 18 per cent of Indigenous Australians were living in an overcrowded dwelling, based on the Canadian National Occupancy Standard (ABS, 2019b). In the literature, some have associated health conditions such as acute rheumatic fever and rheumatic heart disease – for which Indigenous Australians have among the highest rates in the world – with overcrowded living conditions; however, others have suggested that it is difficult to establish a causal association between overcrowded living conditions and poor health outcomes (AIHW, 2020a; Anderson et al., 2004). Another concern is that between 2018 and 2019, 13 per cent of Indigenous Australian families did not live in households with working health hardware – the physical equipment needed to support good health, such as access to water, safe electrical systems, and facilities needed for the safe storage and preparation of food (ABS, 2019b; AIHW, 2020a).

Personal risk factors – such as obesity as well as tobacco, alcohol, and drug use – were also widely discussed in the literature as contributing to Indigenous Australians' health, since these risk factors account for 19 per cent of the health gap between Indigenous and non-Indigenous Australians (AHMAC, 2017; AIHW, 2016a, 2020a, 2020b). Obesity is a worldwide problem and rates are increasing across the entire Australian population but the rate for Indigenous Australians is approximately 1.2 times the rate for non-Indigenous Australians (ABS, 2019b). Smoking is a major risk factor for numerous diseases, although the rates of Indigenous Australians smoking have fallen over the last decade (AIHW, 2020b). The proportion of Indigenous Australians abstaining from alcohol is 1.4 times greater than non-Indigenous Australian adults, but in turn, a higher proportion of Indigenous Australians exceed alcohol risk guidelines (ABS, 2019b). Lastly, the proportion of Indigenous Australians who reported using illicit substances has increased over time from 20 per cent in 2002 to 24 per cent in 2019 (ABS, 2019b).

Culture and Colonisation

Culture is a pillar of Indigenous Australians' identities and was widely discussed in the literature as having a positive influence on their health and wellbeing (Bourke et al., 2018; Dockrey, 2010, McIvor & Napolean, 2009; Salmon et al., 2019). This is because cultural factors such as caring for Country, knowledge and beliefs, language, community, and kinship can provide a foundation for stronger communities and healthier lives (Halloran, 2004).

The ongoing impact of colonisation on Indigenous Australians is another central theme in the literature. Given the importance of culture, community, and Country to Indigenous Australians, the literature suggests that the impact of colonialism and dispossession are important determinants of the health of Indigenous Australians (Andrews, 2012; Brown, 2009; Campbell, McCalman et al., 2018; Klein, 2015; Lavoie, 2014, Reading & Wien, 2009). As a result of the ongoing effects of colonisation, Indigenous Australians often have higher rates of personal risk factors that lead to poorer health outcomes and a greater need for healthcare (AIHW, 2016a).

2.2 INDIGENOUS AUSTRALIANS' MATERNAL AND CHILD HEALTH

Australia's maternity care is among the safest in the world, with low mortality rates compared with other nations in the Organisation for Economic Co-operation and Development (OECD) (Commonwealth of Australia, 2011). However, Indigenous Australian women and children experience a significant disadvantage in health outcomes, compared to non-Indigenous Australians, which can have significant life-long implications (AIHW, 2021a; Sivertsen et al., 2020).

2.2.1 Mortality Rates

Maternal Mortality

Maternal death, defined as the death of a woman while pregnant or within 42 days of the end of pregnancy, is a rare occurrence in Australia. It is expressed using the Maternal Mortality Ratio (MMR), which is the number of maternal deaths per 100,000 women giving birth. Between 2009 and 2018, Australia's MMR was relatively stable, ranging from 5.0 to 8.4 per 100,000 women giving birth. However, of the small number of maternal deaths that occur each year, the MMR of Indigenous Australian women is nearly four times greater than their non-Indigenous Australian counterparts. Between 2012 and 2018, the MMR for Indigenous Australian women was 20.2 per 100,000 women giving birth compared to an MMR for non-Indigenous Australians of only 5.5 per 100,000 women giving birth. Other demographic characteristics common to those women who died between 2012 and 2018 include maternal age, parity, and remoteness. It was found that women aged less than 20 had the highest MMR, followed by women aged 40 or more. Maternal deaths also increased with parity, that is, the number of previous pregnancies. Lastly, it was found that maternal death increased with remoteness. Meaning that women who lived in remote and very remote areas had the highest MMR, followed by women who lived in inner regional areas, and the lowest MMR was recorded for those women who lived in major cities (AIHW, 2021b). The implication of these demographic characteristics is twofold because Indigenous Australian women are already at greater risk of maternal death and are also more likely to live in remote areas, with 26 per cent of Indigenous Australian births occurring in areas classified as remote or very remote, compared to only 2 per cent for non-Indigenous Australian births (Sivertsen et al., 2020).

Child Mortality

Child mortality rates are widely used, in addition to life expectancy rates, as a measure of overall population health. Although Australia's national child mortality rates are low in comparison with other countries, there are significant disparities between the rates for Indigenous and non-Indigenous Australians (AIHW, 2018a). As such, closing the gap in child health outcomes between Indigenous and non-Indigenous Australians was a priority area of action, endorsed by COAG in 2008 (Khalidi, 2012). The target set by the Australian Government was to "halve the gap in mortality rates for Indigenous children under five within a decade (by 2018)" (Australian Government, 2009). In 2018, the Indigenous Australian child mortality rate was 141 per 100,000, more than twice the rate for non-Indigenous children which was 67 per 100,000. Although the child mortality rate for Indigenous Australians improved by 7 per cent between 2008 and 2018, the child mortality rate for non-Indigenous Australians improved at a faster rate and, as a result, the gap widened and the target of 94 child deaths per 100,000 was not met (Australian Government, 2020a). According to the 2020 CTG Report, some of the major health risk factors for Indigenous child mortality have improved; however, these improvements have not translated into stronger improvements in the rates of Indigenous Australian child mortality (Australian Government, 2020a). It is thus acknowledged that further research is needed.

Infant Mortality

Infant mortality refers to the death of a child less than one-year-old and largely stems from problems during pregnancy and birth (Australian Government, 2009). Infant mortality accounts for a significant proportion of total child mortalities, for both Indigenous and non-Indigenous Australians (AIHW, 2018a). However, Indigenous Australians have higher infant mortality rates compared to non-Indigenous Australians. In 2018, Indigenous Australians had an infant mortality rate of 5.1 per 1,000 live births compared with only 2.9 per 1,000 live births for non-Indigenous Australians. Although the Indigenous Australian infant mortality rate improved between 2008 and 2018, it did not improve as fast as the rate for non-Indigenous Australians, so the gap has not narrowed (Australian Government, 2020a).

2.2.2 Key Factors Associated with Worse Child Health Outcomes

The factors underlying the higher infant and child mortality rates for Indigenous Australian children are complex but the risk factors include low birthweight and preterm births, maternal health and behaviours, and access to health services (AIHW 2014; Australian Government, 2020a).

Preterm Birth and Low Birthweight

Of the Indigenous Australian child deaths that occur in the first year of life, 56 per cent of these are due to perinatal conditions such as preterm birth (Australian Government, 2020a). Preterm birth is classified as the birth of a child before 37 weeks gestation, which is associated with a higher risk of adverse neonatal outcomes, a greater risk of dying in infancy, and other more long-term effects (AIHW, 2020c; Kildea, Gao et al., 2019). The incidence of preterm birth is higher among the Indigenous Australian population, with 14 per cent of Indigenous Australian women having preterm births between 2016 and 2017 compared to only 8.4 per cent of non-Indigenous Australian women (AIHW, 2020c).

Being born with a low birthweight is also associated with a higher risk of infant death and thus has a measurable impact on the child mortality target (AIHW, 2014). Incidence of low birthweight among live-born babies is defined as the number of low birthweight – less than 2,500 grams – live-born singleton infants as a proportion of the total number of live-born singleton infants (SCRGSP, 2016). Low birthweight is often due to being born preterm, although the infant may be within the expected weight range for its gestational age (Ford et al., 2018). Accordingly, a higher proportion of Indigenous Australian babies are born at a low birthweight, compared to non-Indigenous Australian babies (AIHW, 2015b). Nationally, between 2016 and 2017, 11 per cent of babies born to Indigenous Australian mothers had a low birthweight compared with only 4.9 per cent of babies born to non-Indigenous Australian mothers (AIHW, 2020c).

The literature suggests that reducing the incidence of preterm births and, as a result, the incidence of low birthweight among live-born babies, would have a positive impact on all other CTG targets – such as the life expectancy, literacy, year 12 completion, and employment targets (Kildea, Gao et al., 2019). This is because babies born preterm are not only at a greater risk of dying in infancy but are also more likely to be diagnosed with developmental delays (AIHW, 2018b; McEwen et al., 2018; OECD, 2019; Westrupp et al., 2019). Low birthweight has also been associated with reduced social, emotional, and cognitive development in childhood (DeKieviet et al., 2012; Guthridge et al., 2015). Furthermore, preterm birth and low birthweight are among the top ten contributors to the increased burden of disease experienced by Indigenous Australians (AIHW, 2016b).

There is growing evidence in the literature which suggests that low birthweight is associated with ill health in childhood and the development of chronic diseases later in life – such as diabetes, hypertension, cardiovascular disease, and renal disease – which are more prevalent in the Indigenous Australian adult population (AIHW, 2020c; Arnold et al., 2016; Hoy & Nicol, 2019; Luyckx et al., 2013; Singh & Hoy, 2003). It is thus believed that being born preterm or at a low birthweight are among the greatest medical threats to the wellbeing of Indigenous Australians (Kildea et al., 2016).

The new CTG framework does not focus on the goal of closing the gap in child mortality rates, as the previous framework did, and instead focusses on reducing the percentage of low birthweight babies. As previously discussed, a greater proportion of Indigenous Australian babies are born at a low birthweight, compared to non-Indigenous Australians, which increases the risk of infant death and other future complications. As such, one of the overarching socio-economic targets in the new framework is that “Aboriginal and Torres Strait Islander children are born healthy and strong”. The specific target is “By 2031, increase the proportion of Aboriginal and Torres Strait Islander babies with a healthy birthweight to 91 per cent”. In both 2017 and 2018, 88.9 per cent of Indigenous Australian babies born were of a healthy birthweight. As such, based on the most recently available data, the target is on track to be met (Australian Government, 2021).

Maternal Health and Behaviours

Maternal health and behaviours during pregnancy are both key drivers of birth outcomes and deaths among Indigenous Australian infants (Australian Government, 2020a). Indigenous Australian mothers have greater exposure to pre-existing conditions – such as anaemia, hypertension, and diabetes – which pose a risk to the mother and baby and is one of the reasons why antenatal care is especially important for Indigenous Australian women (de Costa & Wenitong, 2009). Obesity is another prevalent pre-existing condition and a risk factor for perinatal morbidity and mortality (Thrift & Callaway, 2014). There are also behaviours and risk factors such as poor nutrition, low physical activity, smoking, drug use, and alcohol consumption during pregnancy which have long-lasting negative impacts on both the mother and the child (de Costa & Wenitong, 2009; Greenhalgh et al., 2021; SCRGSP, 2020; Wilson et al., 2017). Smoking, alcohol, and drug use during pregnancy are all linked to at least one adverse perinatal outcome such as low birthweight, the baby being born small for its gestational age, or preterm birth, which can all contribute to child mortality (AIHW 2020d; Brown et al., 2016; Kelly et al., 2010; O'Leary et al., 2020; Oni et al., 2019). The literature suggests that reducing these risk factors among Indigenous Australians requires a holistic approach to healthcare that includes an understanding of, and strategies to overcome, the impacts that intergenerational trauma and racism have had on current ill health and social disadvantage, and of their association with current health behaviours (Oni et al., 2019; Paradies, 2016; SCRGSP, 2020).

Access to and Use of Maternity Services

The literature highlights that a major factor influencing birth outcomes is the closure of maternity services. Between 1992 and 2011, Australia saw a 41 per cent decline in maternity services, especially in rural areas, correlating with a 47 per cent increase in unplanned out-of-hospital births (Kildea et al., 2016). The closure of these services has been unevenly distributed with remote and rural areas having an inferior quality of services and fewer maternity services compared to metropolitan areas (Kildea, Hickey et al., 2019; Rolfe et al., 2017). As such, women living in rural and remote areas have worse outcomes than women living in cities (Rolfe et al., 2017). This disproportionately impacts Indigenous Australian women who are 13 times more likely to live in remote locations compared to non-Indigenous Australian women (Sivertsen et al., 2020). As a result, approximately one-fifth of all Indigenous Australian women live more than an hour from the nearest birthing facility (AIHW, 2017a). Given the unequivocal relationship between distance to maternity services and poorer clinical and psychological outcomes, the closure of maternity services has undoubtedly influenced birthing outcomes (Dietsch et al., 2010; Grzybowski et al., 2011; Kornelsen et al., 2011).

The literature also contributes the observed health disparities, between Indigenous and non-Indigenous Australians, to a lack of culturally appropriate health services (Sivertsen et al., 2020). Culturally safe maternity care encompasses the entirety of a woman's needs – physical, psychological, spiritual, emotional, and cultural (Kildea et al., 2021). However, reports over the years have noted that the Australian maternity system does not meet the needs of Indigenous Australians and is not culturally safe (Carter et al., 2014; Commonwealth of Australia, 2009; Hirst, 2005; Kildea, 1999; Reibel & Walker, 2010). This is a result of Australia's maternity services largely reflecting modern western medical values and perceptions of health, risk, and safety, which can be at odds with the traditional Indigenous Australian ways of giving birth (Barclay et al., 2016; Sivertsen et al., 2020). Additionally, at a national level, measures of healthcare access are often confined to spatial factors including the location of and distance to healthcare services (Davy et al., 2016). However, these quantitative perspectives ignore many of the access issues relevant to Indigenous Australians such as the ability of a health service to accommodate their social and cultural needs or the provision of healthcare by Indigenous Australian staff in a respectful space (Gibson, et al., 2015). The literature thus suggests that the failure to incorporate culturally appropriate services has contributed to the slower than expected progress, in national strategies, to improve outcomes for Indigenous Australian mothers and babies (Australian Government, 2019; AIHW, 2017b; AIHW, 2018c).

The literature also discusses how a poor uptake of antenatal care is associated with Indigenous Australians having worse health outcomes. Antenatal care is provided by skilled birth attendants, for reasons related to pregnancy, and has been found to have a positive effect on the health outcomes of both mothers and babies (AIHW, 2015b; Eades, 2004; Taylor et al., 2013). Evidence has shown that increasing the uptake of antenatal care, particularly in the first trimester, is associated with improved maternal health and positive child health outcomes – both soon after birth and later in life (AIHW, 2018c; AIHW, 2019c; DoH, 2018). However, there is a disparity in how antenatal care is accessed by Indigenous and non-Indigenous Australians (AIHW, 2020c). Indigenous Australian women are less likely to attend mainstream health services, commence antenatal care at the recommended time, and attend the recommended number of antenatal visits (Bar-Zeev et al., 2013; Panaretto et al., 2005; Rumbold et al., 2011). This has been attributed to factors such as geographic isolation, cost, language barriers, inefficient communication, a lack of continuity of carer, and culturally inappropriate or unsafe practices (Sivertsen et al., 2020). Despite these barriers when accessing health services, the literature highlights the importance of Indigenous Australian mothers attending antenatal care given that they are at higher risk of negative outcomes such as maternal mortality, infant mortality, and giving birth to a preterm or low birthweight baby (Australian Government, 2009; de Costa & Wenitong, 2009).

2.2.3 Recommendations to Improve Health Outcomes for Indigenous Australians

The three main recommendations discussed in the literature to improve Indigenous Australians' maternal and child health outcomes include a redesign of mainstream health services, Indigenous-specific health services, and lastly Birthing on Country.

Redesign of the Mainstream Healthcare System

The literature widely discusses the need to redesign the healthcare system, particularly maternity care, to meet the needs of Indigenous Australians (Hickey et al., 2018). This is because the current health system is largely designed by non-Indigenous Australians to address the needs of non-Indigenous Australians (Hickey et al., 2019). However, individuals must not only have physical access to health services to have positive outcomes, but the nature, quality, and appropriateness of such services must also be considered (National Collaborating Centre for Indigenous Health, 2019). That is why it is important that Indigenous Australian mothers have access to maternity care that is respectful, understanding of local culture, and meets their emotional, practical, and clinical needs (Wyndow & Jackiewicz, 2014).

Accordingly, one of the main recommendations to increase Indigenous Australians' engagement with primary health services is to expand cultural safety and competency amongst health workers (Bainbridge et al., 2015; Hickey et al., 2018; Hickey et al., 2019; Nguyen & Gardiner, 2008). Cultural safety describes an environment that is safe and where there is no assault, challenge, or denial of one's identity. This requires health professionals to critically reflect on their own practices so they can adapt to meet the needs of patients (Ramsden, 2002). To do so, non-Indigenous Australian staff will need to undergo cultural competency education and training (Clifford et al., 2015; National Aboriginal Health Strategy Working Party, 1989). However, there is inconsistent training nationally due to limited evidence on the most effective methods of supporting staff aspiring to become culturally competent, as well as the flow-on effects of training to patients, and the best tools for measuring cultural competence in individuals, organisations, and in the maternity setting (Durey, 2010; Goode et al., 2014; Kruske, 2011; Liaw et al., 2019; Paradies et al., 2008; Paradies et al., 2014).

Another example of culturally safe maternity care involves continuity of midwifery care throughout the pregnancy, labour, birth, and the early postnatal period (Hickey et al., 2018). This has been found to have a positive impact on maternal and infant health outcomes, including improvements in antenatal attendance, lower rates of preterm birth, higher infant birthweight, lower child mortality rates, and higher overall satisfaction (Hickey et al., 2018; Sivertsen et al., 2020).

Another widely discussed aspect of redesigning the health system is developing and supporting the Indigenous Australian workforce (Hickey et al., 2018). The literature suggests that Aboriginal women valued care provided by another Aboriginal woman, such as an Aboriginal midwifery student or an Aboriginal Maternal and Infant Care (AMIC) worker (Middleton et al., 2017; Kelly et al., 2014). However, Indigenous Australians are underrepresented in the health workforce (SCRGSP, 2020). It is thus believed that hiring and retaining Indigenous Australian workers and providing training and development opportunities for all staff, are both key to increasing the cultural competence of health professions and workplaces (Harfield et al., 2018; Kildea et al., 2016; SCRGSP, 2020). However, some have argued that there is limited evidence on the most effective ways to form new multidisciplinary teams of Indigenous and non-Indigenous Australian staff (DoH, 2018; Hickey et al., 2019).

The literature also widely suggests that a redesign of the maternity service should involve a partnership with Indigenous Australian women, children, and families to incorporate Indigenous Australian knowledge, cultural practices, and to embed the holistic definition of health and wellbeing (Kildea, 2012; Kildea & Wagner, 2013; NAHSWP, 1989).

Indigenous Australian Health Services

In Australia there are two forms of healthcare available to Indigenous Australians, these include mainstream care and Indigenous-Specific Primary Health Care Services (ISPHCSs). ISPHCSs are community-owned and controlled, and typically incorporate local community and cultural knowledge into service delivery (Harfield et al., 2018; Holland, 2016). Two-thirds of ISPHCSs are Aboriginal Community Controlled Health Services (ACCHSs), which were established in 1971 as a response to the poor service Indigenous Australians experienced within mainstream health services (Durey & Thompson, 2021; SCRGSP, 2020). There are now 150 ACCHSs across Australia, providing comprehensive and culturally safe care through a range of fixed, outreach, and mobile services. Each varies in size, funding, infrastructure, workforce, and the range of services offered. Furthermore, each ACCHS has a governance model whereby each is directly operated, and accountable to, the local Aboriginal community (Campbell, Hunt et al., 2018). As such, each ACCHS is grounded in local culture and values, making them more equipped to overcome the social and cultural determinants of health (Davy et al., 2016; Mackey et al., 2014; SCRGSP, 2020). They also address many of the reasons that Indigenous Australians do not access healthcare by providing transport to and from appointments, making follow up appointments, and having reminders to renew prescriptions and undergo routine testing (Davy et al., 2016; National Aboriginal Community Controlled Health Organisation, 2016). It is thus believed that these services improve the uptake of and continued engagement with healthcare services, as well as greater adherence to healthcare plans. They are also more valued by Indigenous Australians (Allen et al., 2020; SCRGSP, 2020).

However, ISPHCSs and ACCHSs also face serious structural barriers that prevent them from increasing midwifery service coverage. Firstly, there is no appropriate insurance product available for ACCHSs to use their own midwives to provide intrapartum care (Kildea et al., 2021). The Medicare funding is also inadequate to provide this gold-standard of midwifery care, with 92 per cent of funding for maternity services attributed to hospital expenditure rather than primary care (Medicare Benefits Schedule Review Taskforce, 2019). Both the insurance and funding barriers have been highlighted as substantial problems in providing midwifery care to Indigenous Australians (Kildea et al., 2021). Multiple national reviews have, therefore, recommended substantial changes to increase universal access to midwifery care, but these recommendations are yet to be implemented (MBS Review Taskforce, 2019).

Despite the benefits of ISPHCSs and ACCHSs, some have raised concerns about offering separate services for Indigenous Australians as this does not redress discriminatory practices occurring in mainstream health services, which dominate the healthcare system in terms of funding, coverage, and complex treatment (Durey & Thompson, 2021).

Birthing on Country

Another globally discussed recommendation to improve maternity care for indigenous peoples is to develop dedicated programs for ‘Birthing on Country’ (Hickey et al., 2018). ‘Country’ refers to a person’s place of heritage, belonging, and spirituality, and recognises the ongoing connection of Indigenous Australians to their sovereign lands, skies, and seas (Kildea, Hickey et al., 2019). An indigenous person’s place of birth, regardless of whether it is their ancestral Country or not, has cultural and spiritual significance. However, being born on one’s own Country is important to Indigenous Australians because it contributes to the healing from the intergenerational trauma resulting from historic injustices, colonisation, removal, and dispossession of land (Kildea et al., 2015). Birthing on Country is a type of maternity service that is designed and delivered for indigenous women (Hickey et al., 2018). It is an integrated, holistic, and culturally appropriate model of care that should incorporate indigenous worldviews, knowledge, and practices with a customised, evidence-based maternal and infant service (Kildea et al., 2015).

In Australia, over the last couple of decades, maternity services have closed and become decentralised which has resulted in women travelling away from their families and communities to give birth. This has particularly impacted Indigenous Australian women since giving birth on Country strengthens a baby's connection to their traditional lands in a deeply cultural way. Although Australian national policy recommends that Birthing on Country services be developed, implementation is limited by a lack of funding and mechanisms to support Indigenous Australians' control of these services (Kildea, Gao et al., 2019). Birthing in Our Community (BiOC) is one example of such a service in Australia. BiOC is an emerging evidence-based and community-led model of maternity care, which launched in 2013, and is available to women having Indigenous Australian babies at the Mater Mothers' Public Hospital (Brisbane). The program aims to close the gap in Indigenous Australian maternal and infant health outcomes, particularly preterm birth, through the translation of evidence-based strategies into the BiOC program (Hickey et al., 2018). A Lancet study demonstrated that Indigenous Australian women who attended Mater Mothers' Public Hospital (Brisbane) and received care through the BiOC service had better clinical outcomes than Indigenous Australian women who received standard care (Kildea et al., 2021).

2.3 GAPS IN THE LITERATURE

2.3.1 Reporting on Past Programs and Synthesised Findings

One of the gaps that exists in the literature is that little is understood about the programs and initiatives that have been used in an attempt to close the gap. Few studies dissected actual programs and initiatives undertaken, to understand why they failed and how they could be improved. Having synthesised findings is also necessary to reflect, acknowledge, and report on lessons learned so that effective policies can be implemented in the future. However, apart from the 2021 review by the Closing the Gap Clearinghouse, there have been limited attempts to synthesise research and findings (PM&C, 2018b). These are both significant gaps in the literature.

2.3.2 Healthcare Expenditure and Lack of Economic Evidence

It was identified in the literature that Indigenous Australians have a greater health burden and more complex health needs compared to non-Indigenous Australians; as such, they should receive a greater sum of health expenditure. However, this is not the case. This means that there is the potential for significant efficiency gains by more effectively allocating money, although this has not been investigated in the literature (Angell, 2017). While the literature identifies factors that contribute to Indigenous Australians' having worse health outcomes, there is a lack of economic evidence on how to best prioritise funds to maximise the benefit for Indigenous Australians. This evidence is necessary to determine which programs the Government should stop funding and the amount of investment that is required in the programs that are effective. Therefore, this lack of evidence is another gap in the literature.

2.3.3 Economic Techniques

Economic techniques have been identified as one of the reasons for the lack of evidence on allocating funds to Indigenous Australians' health. The existing economic techniques cannot incorporate factors that lie outside the traditional measures of health. For example, the social determinants of health are particularly important to the health outcomes of Indigenous Australians but cannot be accounted for by the traditional health economic evaluation methods (Angell, 2017). This presents a challenge to the field of health economics to establish new economic techniques to address this gap in the literature.

2.3.4 Training and Hiring of Health Staff

One of the recommendations in the literature to improve maternity care and outcomes for Indigenous Australian mothers and children is to develop and expand cultural safety and competency among healthcare workers (Bainbridge et al., 2015; Hickey et al., 2018; Hickey et al., 2019; Nguyen & Gardiner, 2008). However, there is inconsistent training nationally due to limited evidence on the most effective methods of supporting staff to become culturally competent, as well as the flow-on effects of training to patients, and the best tools for measuring cultural competence in individuals, organisations, and in the maternity setting (Durey, 2010; Goode et al., 2014; Kruske, 2011; Liaw et al., 2019; Paradies et al., 2008; Paradies et al., 2014). Another recommendation discussed in the literature as part of redesigning the health system is to support the Indigenous Australian health workforce, since Indigenous Australians are underrepresented in this field (Hickey et al., 2018; SCRGSP, 2020). However, some have argued that there is limited evidence on the most effective ways to form new multidisciplinary teams of Indigenous and non-Indigenous Australian staff (DoH, 2018; Hickey et al., 2019). As such, further research is required to address these gaps in the literature.

2.3.5 Indigenous Australian Health Services

The literature highlights the benefits of culturally appropriate health programs and services. The literature also widely discusses how ISPHCSs and ACCHSs have the intrinsic cultural knowledge to deliver holistic and targeted services to Indigenous Australians. However, there is limited published literature and empirical evidence of the contribution of these services to improving Indigenous Australians' health (Campbell, Hunt et al., 2018). Although some small-scale, localised studies – such as the Lancet study on BiOC – have reported health benefits for Aboriginal people attending ISPHCSs or ACCHSs, others have found no such distinction between ISPHCSs or ACCHSs and mainstream health services (Mackey et al., 2014). However, caution is required when using the results from these small-scale, localised studies and generalising to all ISPHCSs and ACCHCSs (Mackey et al., 2014). Therefore, one of the gaps in the literature is that there has not been a national analysis of the health benefits of ISPHCS or ACCHSs for Indigenous Australians compared with mainstream care. There is also limited empirical understanding of the role that these services play in the healthcare utilisation patterns of Indigenous Australians. Additionally, there is no consensus on the best way to deliver and fund these services (Angell, 2017). These are all important gaps in the literature that, if filled, may provide valuable information about improving Indigenous Australians' health.

2.4 SUMMARY AND IMPLICATIONS

One of the biggest gaps that exists in the literature surrounds the effectiveness of ISPHCSs and ACCHSs in improving health outcomes for Indigenous Australians. The literature discusses their suitability to effectively address the healthcare needs of Indigenous Australians. However, there is limited empirical evidence on their effectiveness in improving clinical outcomes. Although it is important that Indigenous Australians are able to access culturally appropriate health services, from a health economics perspective it is just as important that scarce resources are being used to improve the health of the Indigenous Australian population (Angell, 2017).

As such, this thesis aims to identify whether, given the available data, Indigenous Australians have better maternal and child health outcomes when they utilise Aboriginal Health Services (AHSs) as opposed to Mainstream Health Services (MHSs). The purpose of this thesis is not to use the results to argue whether or not AHSs, and more broadly ACCHSs or ISPHCSs, should be funded or even exist. The theory is clear, these services are better suited to address the needs of Indigenous Australians. However, it is not clear whether this materialises into better clinical outcomes. Therefore, this thesis aims to be a preliminary study to firstly determine how AHSs perform, compared to MHSs, in treating Indigenous Australians. The results should then be used to determine what further research is needed to ensure these culturally appropriate services are providing care that can materialise into the best possible improvements in Indigenous Australians' health.

As such, this thesis will add to the existing literature on strategies to close the gap in maternal and child health outcomes in Australia. However, this thesis is not able to address all of the gaps which exist in the literature. More extensive evidence on the strategies which are effective in improving health outcomes among Indigenous Australian families is urgently needed to inform policy, practice, and funding decisions (Kildea et al., 2021).

Chapter 3: Research Design

This chapter describes the design adopted to achieve the purpose and significance of the research, as stated in section 1.3. Firstly, section 3.1 discusses the dataset used, the sample and participants included, the data collection techniques, and the ethical clearance obtained to originally collect such data. Section 3.2 discusses the key variables and primary outcomes. Section 3.3 discusses how the data was analysed.

3.1 DATASET

3.1.1 Longitudinal Study of Indigenous Children (LSIC)

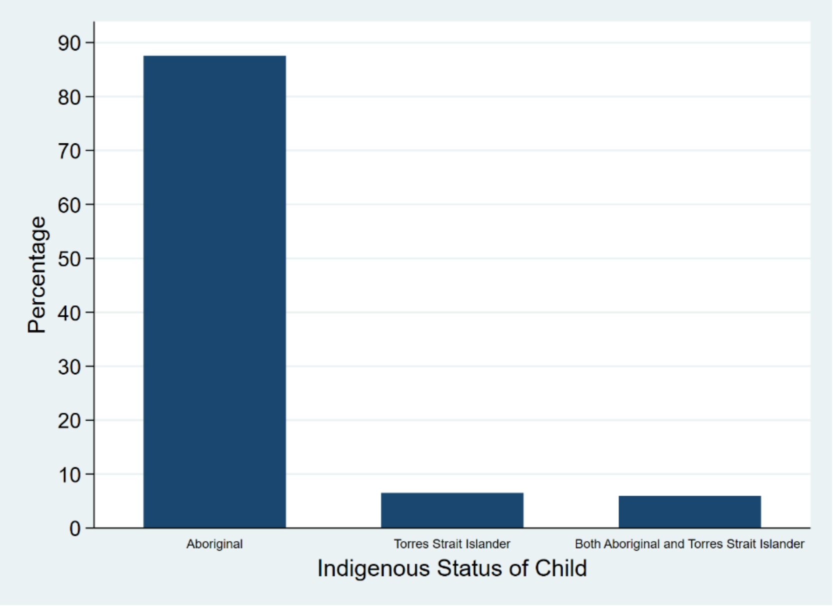
This thesis used Wave One of the Footprints in Time: the Longitudinal Study of Indigenous Children (LSIC) as its data source. LSIC is funded by the Australian Government and managed by FaHCSIA. The Footprints in Time (LSIC) Steering Committee oversees the design, development, and implementation of the study, which is then conducted and managed by the Department of Social Services (DSS). LSIC is one of the largest longitudinal studies of indigenous people worldwide. Each year the DSS collects qualitative and quantitative data on Indigenous Australian children, their families, their communities, and services available to them. The aim is to improve the understanding of, and the policy response to, the diverse circumstances faced by Indigenous Australians, which can then be utilised by all levels of government, researchers, service providers, parents, and communities (FaHCSIA, 2009b).

3.1.2 LSIC Study Sample and Participants

The LSIC is described as being a “non-representative purposive sample” (FaHCSIA, 2009b, p. 9). Eleven sites were chosen to cover a range of socio-economic and community environments in which Indigenous Australians live. The plan was to select approximately 150 children from each of the eleven sites, providing a sample of 1,650 children. The reference population was Indigenous Australian children born between December 2003 and November 2004 for the child cohort and between December 2006 and November 2007 for the baby cohort. While some sites had fewer than 150 eligible children, other sites had excess. In total, 1,687 children were included in the first wave of the LSIC; however, the provided dataset only included 1,671 children.

Although not a nationally representative study, the distribution of children in the LSIC sample is relatively consistent with the distribution of Indigenous Australian children aged zero to five years across Australia, as per ABS estimates. The proportion of Aboriginal, Torres Strait Islander, and both Aboriginal and Torres Strait Islander children was also reflective of the proportion of these populations at the study sites (FaHCSIA, 2009b). See Figure 3.1 for a graphical representation of the proportion of children as per their indigenous status. There were also approximately equal numbers of male and female children included in the study, with 50.87 per cent male and 49.13 per cent female.

Figure 3.1 Indigenous Status of Children Included in the Study



3.1.3 Data Collection

Recruitment for the first wave of the LSIC commenced in December 2007. After the study sites were selected and initial consultation with communities indicated support, the study was promoted through community engagement events such as National Aboriginal and Islanders Day Observance Committee (NAIDOC) week as well as one-on-one consultations with communities (FaHCSIA, 2009b).

The first wave of the LSIC collected quantitative and qualitative data. Quantitative data was collected for a range of information concerning the study children as well as their carers and teachers. Qualitative information, where possible, was recorded on the stories and life events of the family of the study children (FaHCSIA, 2009b).

This data was collected using interviews, the majority of which were conducted by FaHCSIA-employed Indigenous Australian research officers. Although some interviews were conducted by non-Indigenous Australian FaHCSIA employees and some Roy Morgan research interviewers (FaHCSIA, 2009b).

3.1.4 LSIC Ethics

Ethical clearance for the LSIC was obtained from the Australian Government Department of Health (DoH) and the Ageing Departmental Ethics Committee (DEC), which was chosen as the primary Human Research Ethics Committee (HREC) for the study. Additionally, ethical clearance and support were obtained from state and territory HRECs for each LSIC site (FaHCSIA, 2009b).

3.2 RESEARCH DESIGN

3.2.1 Dependent Variables

Seven primary outcomes were defined prior to analysis, based on the literature and similar studies which have been conducted. These primary outcomes are based on the study child and their mother. The first two outcomes are based on pregnancy check-ups[3], such as the mothers having regular check-ups and having their first check-up within the first trimester of pregnancy (<14 weeks gestation). The second two primary outcomes are based on maternal behaviours, such as the mothers consuming alcohol or smoking cigarettes during their pregnancy with the study child. The following two primary outcomes are birth outcomes such as the study child being born preterm (<37 weeks gestation) or being born with a low birthweight (<2500g). The last outcome is based on the mother breastfeeding the study child.

Due to the way the dataset was organised with some women not answering questions or not being asked certain questions, there were missing variables. Therefore, new dummy variables were created for each of the primary outcomes with ‘one’ used to indicate that the outcome did occur – for example, the mother did have regular check-ups and the study child was breastfed – and ‘zero’ was used to indicate that the outcome did not occur – for example, the mother did not have regular check-ups.

3.2.2 Independent Variables

A significant part of the statistical analysis involves the comparison of primary outcomes based on the medical service attended. The purpose of this thesis is to compare the primary outcomes for mothers who attended an Aboriginal Health Service (AHS) with those who attended a Mainstream Health Service (MHS). The original dataset was not created with this study in mind and so the data was adjusted for the purpose of this analysis. The original dataset

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[3] The LSIC dataset did not specify that these were antenatal appointments; therefore, these will be referred to as pregnancy check-ups or simply check-ups throughout the remainder of the thesis.

was separated into categories for whether women saw a doctor, midwife, obstetrician, or Aboriginal Health Worker (AHW) for their check-ups and whether they attended an Aboriginal Health Service (AHS), Community Health, General Practice, Hospital, or Other. As such, a dummy variable, “medical service”, was created to determine whether women attended an AHS or a MHS. The dummy variable used ‘one’ to indicate AHSs, which included women who attended an AHS or saw an AHW. The dummy variable used ‘zero’ to indicate MHSs, which means that a woman saw a doctor, midwife, or obstetrician anywhere other than an AHS.

3.3 STATISTICAL ANALYSIS

All analyses were undertaken using Stata version 15. Firstly, graphs were executed using Stata’s graphing commands, without any kind of manipulation of the data unless otherwise specified in the results section.

As per other studies in the literature which compare primary outcomes for two different models of care, Odd Ratios (ORs) and Adjusted Odds Ratios (AORs) were used. An OR is the ratio of the odds of one group to the corresponding odds of another group. In the analyses, the OR was based on AHSs in comparison to MHSs, the reference group.

3.3.1 Hypothesis Testing

The hypothesis being tested was that the OR and AOR were not equal to one, meaning that there was a difference in the odds of a primary outcome based on the medical service attended. A 95 per cent Confidence Interval (CI) was used as this was consistent with the literature. This meant that the p-value was 5 per cent. Therefore, the p-value needed to be below 0.05 for the results to be statistically significant.

3.3.2 Regressions

The ORs of the primary outcomes were calculated using a bivariate logistic regression and a 95 per cent CI was used, meaning that p-values less than 0.05 were considered statistically significant. Potential confounders were identified in the literature. Bivariate logistic regression was used to determine the effect of these potential confounders on primary outcomes. Those potential confounders that were found to have a p-value less than 0.1 were then used in the multivariate logistic regression. The AORs of the primary outcomes were calculated using a multivariate logistic regression and a 95 per cent CI was used, meaning that p-values less than 0.05 were considered statistically significant. The footnotes of each table indicate which confounders were used in the multivariate regression for each primary outcome.

Chapter 4: Results

Chapter 4 includes the results of the study based on the primary outcomes that were defined prior to analysis, as discussed in section 3.2.1. The chapter starts with the results on pregnancy check-ups, followed by maternal behaviours during pregnancy, birth outcomes, and then concludes by revealing the results as to whether the study children were breastfed.

4.1 PREGNANCY CHECK-UPS

Of the 1,671 children included in the LSIC dataset, 895 of the mothers answered whether or not they had at least one check-up during their pregnancy with the study child. 871 or 97.32 per cent of mothers answered that they had at least one check-up throughout their pregnancy. 866 mothers then answered whether or not they had regular pregnancy check-ups, with the other five remaining mothers who had at least one check-up refusing to answer or not recalling whether they had regular check-ups. Of the women who were able to answer, 94.69 per cent had regular check-ups whilst 5.31 per cent did not. Furthermore, 32.55 per cent attended an AHS and 67.45 per cent attended a MHS for their check-ups.

Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of women who had regular check-ups throughout their pregnancy, based on the medical service attended. The results are displayed in Table 4.1. Based on the OR, the odds of a study child's mother who attended an AHS having regular check-ups was 1.20 times greater than a mother who attended a MHS. However, this is not statistically significant given the p-value. Similarly, based on the AOR, the odds of a study child's mother having regular check-ups was 1.28 times greater if they attended an AHS compared to those who attended a MHS. Again, however, given the p-value this is not statistically significant.

Table 4.1 Mother Had Regular Check-Ups During their Pregnancy with the Study Child[1]

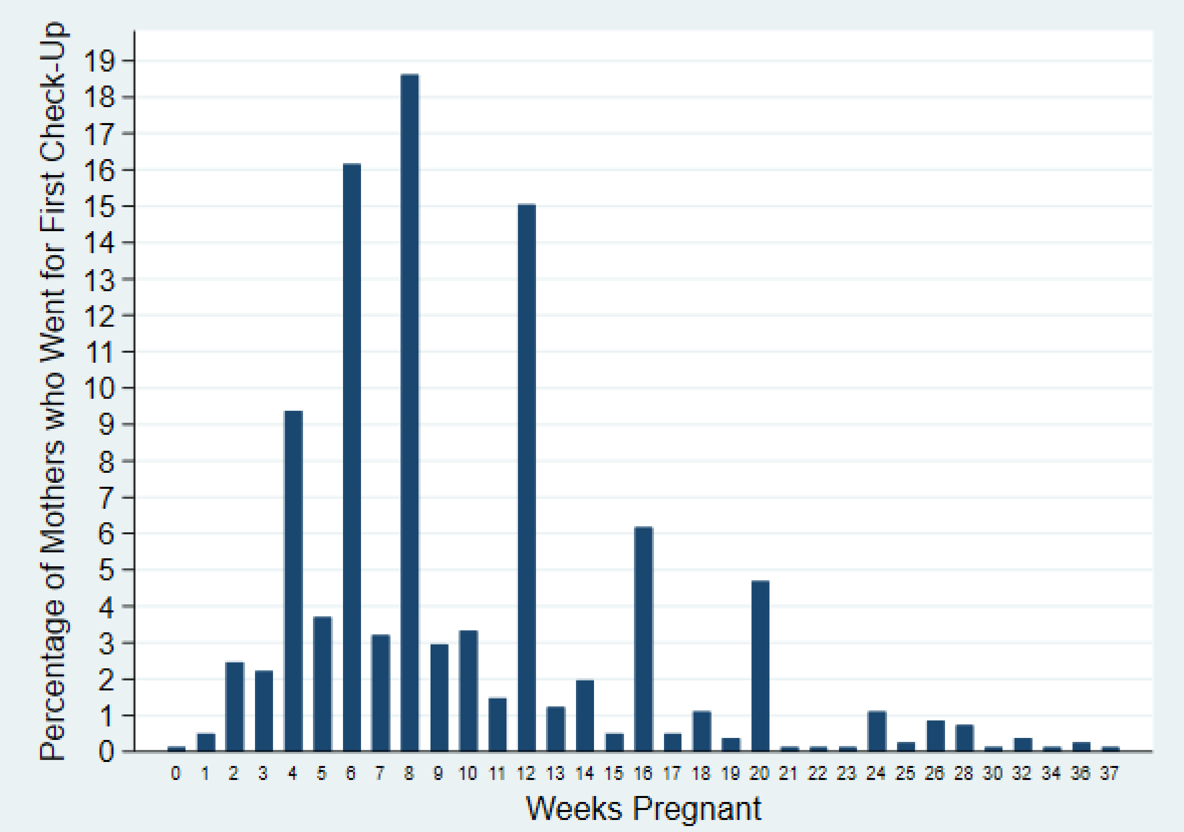
OR (95% CI)	**P-Value**	**AOR[2] (95% CI)**	**P-Value**
1.20 (0.62-2.32)	0.590	1.28 (0.66-2.50)	0.464

[1] The answer was self-determined by the study child's mother with no criteria provided to answer the question.

[2] Adjusted for mothers who smoked during their pregnancy with the study child.

Of the 1,671 study children included in the survey, only 811 mothers answered how many weeks pregnant they were when they went for their first check-up whilst pregnant with the study child. 80.40 per cent of these women attended their first check-up within the first trimester of pregnancy, which is considered before 14 weeks gestation (AIHW, 2021a). Figure 4.1 shows the percentage of women that attended their first check-up in each week of pregnancy. As can be seen in the figure, nearly 19 per cent of mothers attended their first check-up in week eight, which was also the median week for women having their first check-up. The mean week at which a woman went for her first pregnancy check-up was 9.89 weeks. The skewness value of 1.418, means the data was highly right-skewed which can be visually seen in the figure. This means that the majority of women went for their first check-up early in the pregnancy with fewer women attending their first check-up later in the pregnancy.

Figure 4.1 Number of Weeks Pregnant at First Check-Up with the Study Child



Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of women who attended their first pregnancy check-up within the first trimester of pregnancy, based on the medical service attended. The results are displayed in Table 4.2. The OR of 1.04 means that the odds of a study child's mother attending their first pregnancy check-up within the first trimester was 1.04 times greater if they attended an AHS compared with attendance at a MHS. However, given the p-value (0.830) this is not statistically significant. Similarly, the AOR of 1.08 means that the odds of a mother from the AHS group attending their first check-up within the first trimester was 1.08 times greater than in the MHS group. Again, however, given the p-value this is not statistically significant.

Table 4.2 OR and AOR of Mothers Whose First Check-Up Was in the First Trimester of Pregnancy with the Study Child, Based on the Medical Service Attended[1]

OR (95% CI)	**P-Value**	**AOR[2] (95% CI)**	**P-Value**
1.04 (0.72-1.51)	0.830	1.08 (0.75-1.59)	0.662

[1] The first trimester was considered as before 14 weeks gestation (AIHW, 2021a).

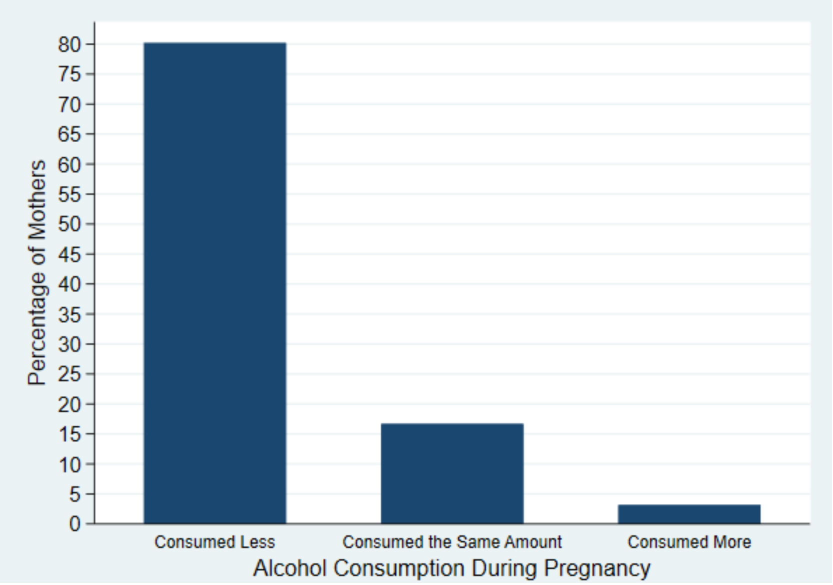
[2] Adjusted for the maternal age and mothers who smoked during pregnancy.

4.2 MATERNAL BEHAVIOURS DURING PREGNANCY

4.2.1 Alcohol Consumption During Pregnancy

Of the 1,671 children – and their parents – included in the survey, only 1,487 mothers answered whether or not they drank during their pregnancy with the study child. The findings were that 22.53 per cent of mothers did drink alcohol while pregnant and 77.47 per cent of mothers did not. As displayed in Figure 4.2, 318 of the total 335 mothers that consumed alcohol during their pregnancy declared how much they consumed, with the majority consuming less whilst pregnant compared to pre-pregnancy.

Figure 4.2 Mothers' Alcohol Consumption During their Pregnancy with the Study Child



Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of women who consumed alcohol throughout their pregnancy, based on the medical service attended. The results are displayed in Table 4.3. Based on the OR, the odds of a study child's mother consuming alcohol during their pregnancy was 1.12 times greater if they attended an AHS compared to a MHS. However, given the p-value this is not statistically significant. Similarly, the AOR of 1.17 means that the odds of a mother from the AHS group drinking alcohol during their pregnancy was 1.17 times greater than for mothers in the MHS group. Again, however, given the p-value this is not statistically significant.

Table 4.3 OR and AOR of Mothers Who Consumed Alcohol During their Pregnancy with the Study Child, Based on the Medical Service Attended

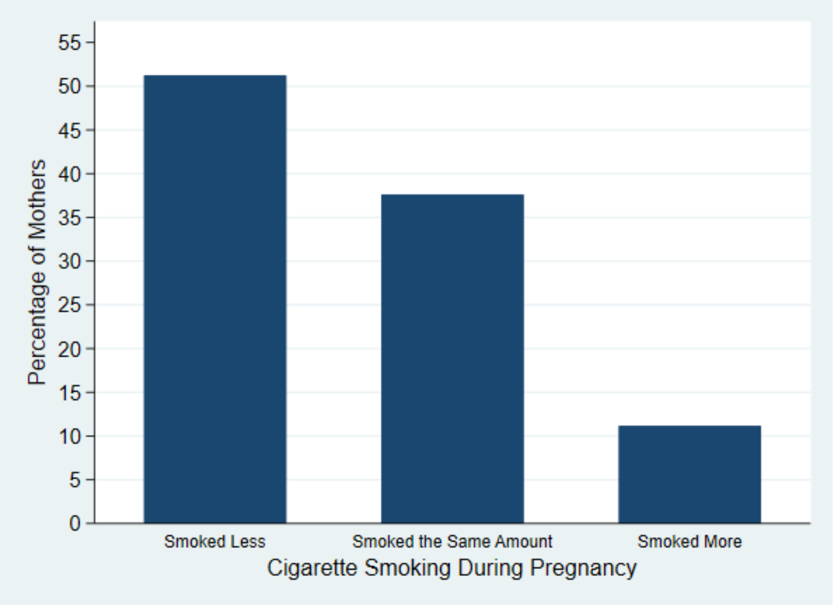
OR (95% CI)	**P-Value**	**AOR[1] (95% CI)**	**P-Value**
1.12 (0.81-1.55)	0.499	1.17 (0.84-1.63)	0.366

[1] Adjusted for maternal age and mothers' level of remoteness (based on the Australian Statistical Geographical Classification – Remoteness Area (ASGC-RA)).

4.2.2 Cigarette Smoking During Pregnancy

Of the 1,671 children – and their parents – included in the survey, 1,490 mothers answered whether or not they smoked cigarettes during their pregnancy with the study child. 49.66 per cent of mothers did smoke cigarettes during their pregnancy while 50.34 per cent of mothers did not. Of the 740 mothers that did smoke during pregnancy, only 726 mothers declared how much they smoked during their pregnancy. Figure 4.3 shows that smoking behaviour during pregnancy, compared to pre-pregnancy, varied greatly amongst the women.

Figure 4.3 Mothers' Cigarette Intake During their Pregnancy with the Study Child



Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of women who smoked cigarettes throughout their pregnancy, based on the medical service attended. The results are displayed in Table 4.4. The OR of 1.38 means that the odds of a mother smoking during her pregnancy with the study child was 1.38 times greater if she attended an AHS compared to a MHS. This difference in smoking during pregnancy between the two medical services is statistically significant based on the p-value of 0.030. Similarly, the AOR of 1.20 means that the odds of a mother smoking during her pregnancy with the study child was 1.20 times greater if she attended an AHS compared to a MHS. However, given that the p-value is greater than 0.05, this is not statistically significant. Therefore, after adjusting for other significant variables, the medical service attended did not have a statistically significant influence on whether mothers smoked during their pregnancy.

Table 4.4 OR and AOR of Mothers Who Smoked Cigarettes During their Pregnancy with the Study Child, Based on the Medical Service Attended

OR (95% CI)	**P-Value**	**AOR[1] (95% CI)**	**P-Value**
1.38 (1.03-1.84)	0.030	1.20 (0.89-1.63)	0.232

[1] Adjusted for mothers who had regular check-ups throughout their pregnancy, mothers who had their first check-up within the first trimester, mothers who were socioeconomically disadvantaged (based on the Socio-Economic Indexes for Areas (SEIFA) decile of index of relative socioeconomic disadvantage), mothers' level of remoteness (based on the ASGC-RA), and mothers' level of isolation (based on the Level of Relative Isolation (LORI)).

4.3 BIRTH OUTCOMES

Of the total 1671 children included in the LSIC, 10.71 per cent were born preterm, 7.90 per cent were born with a low birthweight, and 4.67 per cent were born both preterm and with a low birthweight. Additionally, as the literature suggests, there is a moderately strong and statistically significant association between low birthweight and preterm birth, with a correlation of 0.43 and a p-value of 0.00.

Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of women who had a preterm birth, based on the medical service attended. The results are displayed in Table 4.5. The OR of 1.53 means that the odds of having a preterm birth was 1.53 times greater for those women who attended an AHS compared to a MHS. This is statistically significant given the p-value is less than 0.05. However, after adjusting for numerous significant factors, the medical service attended no longer had a significant impact on whether the child was born preterm, since the p-value (>0.05) makes the AOR statistically insignificant.

Table 4.5 OR and AOR of Preterm Birth Based on the Medical Service Attended

OR (95% CI)	**P-Value**	**AOR[1] (95% CI)**	**P-Value**
1.53 (1.00-2.34)	0.049	1.43 (0.92-2.24)	0.113

[1] Adjusted for maternal age, mothers who were socioeconomically disadvantaged (based on SEIFA decile of index of relative socioeconomic disadvantage and SEIFA decile of index of economic resources), mothers' level of remoteness (based on the ASGC-RA), mothers' level of isolation (base on LORI), mothers who had problems during pregnancy (including diabetes), and children born as part of a multiple.

Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of study children born with a low birthweight, based on the medical service attended. The results are displayed in Table 4.6. The OR of 2.15 means that the odds of a low birthweight baby was 2.15 times greater if a mother attended an AHS for pregnancy check-ups in comparison to a MHS. This is statistically significant at 5 per cent given the p-value of 0.000. The AOR of 1.83 means that the odds of mothers who attended an AHS having a low birthweight baby was 1.83 times greater than mothers who attended a MHS, and this is statistically significant given the p-value is less than 0.05.

Table 4.6 OR and AOR of Low Birthweight Birth Based on the Medical Service Attended

OR (95% CI)	**P-Value**	**AOR[1] (95% CI)**	**P-Value**
2.15 (1.56-2.98)	0.000	1.83 (1.26-2.66)	0.001

[1] Adjusted for maternal age, mothers who had regular check-ups throughout their pregnancy, mothers who were socioeconomically disadvantaged (based on SEIFA decile of index of relative socioeconomic disadvantage and SEIFA decile of index of economic resources), mothers' level of remoteness (based on the ASGC-RA), mothers' level of isolation (base on LORI), mothers who smoked during their pregnancy, mothers who had problems during pregnancy, children born as part of a multiple, and children born preterm.

4.3.1 Maternal Behaviours and Birth Outcomes

Figure 4.4 and Figure 4.5 exhibit the statistics for children born preterm and with a low birthweight, respectively, based on whether or not their mother drank alcohol or smoked during their pregnancy. The graphs display that maternal behaviours had a more visible impact on children being born with a low birthweight than those born preterm.

Figure 4.4 Maternal Behaviours During Pregnancy with the Study Child and the Percentage of Children Born Preterm

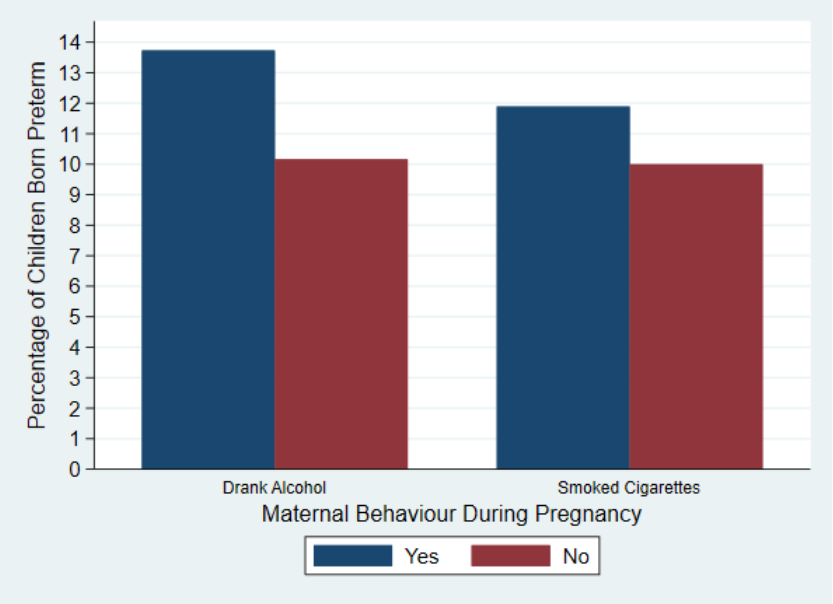
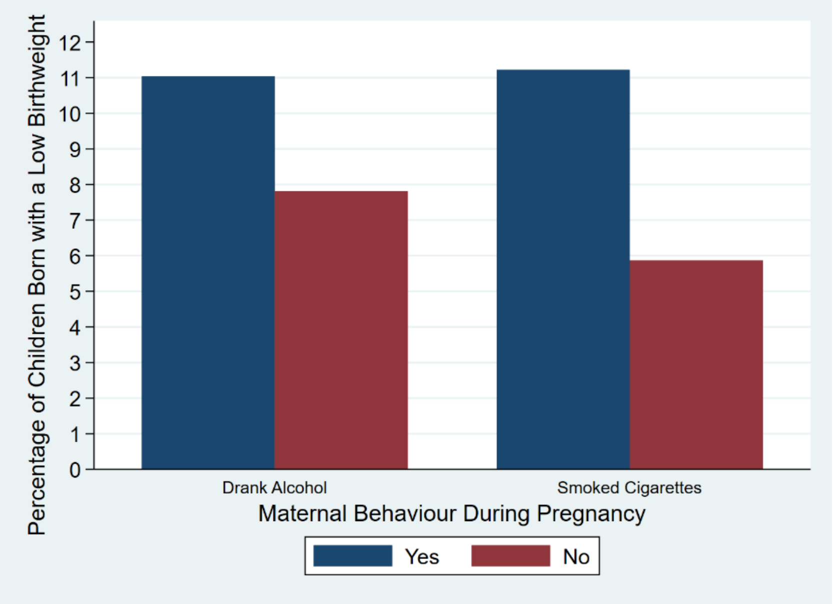


Figure 4.5 Maternal Behaviours During Pregnancy the Study Child and the Percentage of Children Born with a Low Birthweight



4.4 BREASTFEEDING

Of the 1,671 children and their parents included in the study, 1,658 mothers indicated whether or not they breastfed the study child. The results were that 79.55 per cent of children were breastfed and 20.45 per cent of children were not.

Bivariate and multivariate logistic regressions were used to determine the OR and AOR, respectively, of whether the child was breastfed based on the medical service attended. The results are displayed in Table 4.7. Based on the OR, the odds of a woman breastfeeding the study child were 1.29 times greater for a woman who attended an AHS for check-ups compared to a MHS. However, this is not statistically significant at five per cent. Similarly, the AOR of 1.23 indicates that the odds of a woman breastfeeding were 1.23 times greater if they attended an AHS compared to a MHS. Again, however, this is not statistically significant.

Table 4.7 OR and AOR of Study Children Being Breastfed, Based on the Medical Service Attended

OR (95% CI)	**P-Value**	**AOR[1] (95% CI)**	**P-Value**
1.29 (0.88-1.90)	0.196	1.23 (0.82-1.85)	0.325

[1] Adjusted for maternal age, mothers who had regular check-ups throughout their pregnancy, mothers who had their first check-up within the first trimester, mothers' education, mothers' level of remoteness (based on the ASGC-RA), mothers' level of isolation (base on LORI), and mothers who smoked during their pregnancy.

Chapter 5: Discussion

Chapter 5 contains a full discussion, interpretation and evaluation of the results with reference to the literature. The chapter discusses each of the primary outcomes that were defined prior to analysis, as discussed in section 3.2.1.

5.1 PREGNANCY CHECK-UPS

Evidence has shown that increasing the uptake of antenatal care, particularly in the first trimester (before 14 weeks gestation), is associated with improved maternal health and positive child health outcomes – both soon after birth and later in life (AIHW, 2018c; AIHW, 2019c; DoH, 2018). However, there is a disparity in how antenatal care is accessed by Indigenous and non-Indigenous Australian mothers (AIHW, 2020c).

Firstly, the literature suggests that Indigenous Australian women were less likely to attend mainstream health services (Bar-Zeev et al., 2013; Panaretto et al., 2005; Rumbold et al., 2011). However, the results of this analysis indicate that more women attended a MHS (67.45 per cent) for their check-ups whilst pregnant with the study child, as opposed to an AHS (32.55 per cent). Although it is not known whether the mothers had access to both an AHS and a MHS and could, therefore, choose their preferred model of care. As such, these results should not be used to make inferences about Indigenous Australian mothers' preference for AHSs or MHSs in providing pregnancy check-ups.

Secondly, the literature indicates that Indigenous Australian women are less likely to attend the recommended number of antenatal visits (Bar-Zeev et al., 2013; Panaretto et al., 2005; Rumbold et al., 2011). The results indicate that a high percentage (94.69 per cent) of mothers had regular check-ups whilst pregnant with the study child. Additionally, based on the OR and AOR, the results indicate that there was not a statistically significant difference in women having regular check-ups between the two medical services. It should be noted, however, that one drawback to the validity of these results is that the mothers were simply asked whether they had regular check-ups and responded to the question with either a yes or no. A criterion was not used to assess whether mothers did in fact have regular check-ups during their pregnancy. For instance, the Australian Government recommends that first-time mothers with an uncomplicated pregnancy have ten antenatal visits but only seven visits for subsequent uncomplicated pregnancies (DoH, 2018). As such, given that the women answered the questions as they saw fit, this does impinge on the accuracy of the results.

Thirdly, the literature discusses how Indigenous Australian women are less likely to commence antenatal care at the recommended time (Bar-Zeev et al., 2013; Panaretto et al., 2005; Rumbold et al., 2011). The Australian Pregnancy Care Guidelines recommends that women have their first antenatal visit within the first 10 weeks of pregnancy; however, the proportion of women receiving antenatal care in the first trimester is the most widely reported indicator (AIHW, 2021a; DoH, 2018). The results indicate that a high percentage (80.40 per cent) attended their first check-up within the first trimester. This is higher than the overall percentage (77 per cent) of women Australian women in 2019 who attended their first antenatal appointment in the first trimester (AIHW, 2021a). It should also be noted that, based on the OR and AOR, there was not a statistically significant difference in women attending their first check-up within the first trimester based on the medical service they attended.

5.2 MATERNAL BEHAVIOURS DURING PREGNANCY

Maternal behaviours during pregnancy are key drivers of birth outcomes and deaths among Indigenous Australians (Australian Government, 2020a).

Alcohol consumption during pregnancy can lead to poorer perinatal outcomes including preterm birth, being of a lower birthweight for gestational age, and foetal alcohol spectrum disorder. As such, it is advised that women who are pregnant or planning a pregnancy should not drink alcohol (National Health and Medical Research Council (NHMRC), 2020). The results indicate that 22.53 per cent of mothers consumed alcohol whilst pregnant with the study child. This is similar to the 2009 national rates of self-reported alcohol consumption during pregnancy amongst Indigenous Australians which was 20 per cent but reduced to nine per cent by 2019. The literature suggests that holistic health services – such as AHSs – can help to further reduce this risk factor amongst Indigenous Australians during pregnancy (SCRGSP, 2020). However, there was not a statistically significant difference in alcohol consumption between those mothers who attended AHSs and those who attended MHSs. Therefore, AHSs – and more broadly ISPHCS and ACCHCS – may not be able to further reduce alcohol consumption during pregnancy amongst Indigenous Australians.

Smoking tobacco is one of the most significant yet preventable risk factors for poor birth outcomes and subsequent infant mortality (AIHW, 2014; SCRGSP, 2020). The results of the LSIC analysis indicate that there was not a significant difference between the proportion of mothers that smoked during their pregnancy with the study child (49.66 per cent) and those that did not (50.34 per cent). These results are similar to the 2009 national percentage of Indigenous Australians who smoked which was 52 per cent but had reduced to 22 per cent by 2018. Culturally responsive healthcare has been identified as being key to helping Indigenous Australians quit smoking whilst pregnant (SCRGSP, 2020). The OR does not indicate that this was the case as the odds of a mother smoking during her pregnancy with the study child was 1.38 times greater if she attended an AMS compared to a MHS. However, after adjusting for other significant variables, the medical service attended did not have a statistically significant influence on whether mothers smoked during their pregnancy.

5.3 BIRTH OUTCOMES

The incidence of preterm birth and children being born with a low birthweight is higher amongst Indigenous Australians, compared to non-Indigenous Australians (AIHW, 2020c). These birth outcomes increase the risk of infant death and other future complications – such as ill-health and reduced cognitive development in childhood as well as the development of chronic diseases later in life (AIHW, 2020c; Arnold et al., 2016; DeKieviet et al., 2012; Guthridge et al., 2015; Hoy & Nicol, 2019; Luyckx et al., 2013; Singh & Hoy, 2003). As such, when the CTG framework was current, the literature suggested that reducing the incidence of preterm births and, as a result, the incidence of low birthweight among live-born babies, would not only have a measurable impact on the child mortality target but would also have a positive impact on all other CTG targets – such as the life expectancy, literacy, year 12 completion, and employment targets (AIHW, 2014; Kildea, Gao et al., 2019). However, there is a lack of evidence on how to best reduce preterm birth, low birthweight, and infant mortality amongst Indigenous Australians (Kildea et al., 2021; Kildea, Gao, et al., 2019). Some small-scale, localised studies – such as the Lancet study on BiOC – have reported indigenous-specific services having better outcomes for indigenous people; however, other studies have found no such distinction between ACCHS and mainstream services (Kildea et al., 2021; Kildea, Gao et al., 2019; Mackey et al., 2014).

The results of the LSIC analysis indicate that mothers who attended an AHS were more likely to have a preterm birth. However, after adjusting for numerous significant factors, the medical service attended no longer had a statistically significant impact on children being born preterm. Additionally, the results indicate that the odds of having a low birthweight baby, after adjusting for significant factors, was 1.83 times greater if a mother attended an AHS for pregnancy check-ups in comparison to a MHS and this is statistically significant.

Therefore, unlike the literature which suggests that indigenous-specific services deliver better clinical outcomes for indigenous women, this was not the case for the Indigenous Australian women included in the LSIC who attended AHSs as opposed to MHSs. One of the possible reasons for the discrepancy is that indigenous-specific services may have a more complex caseload than MHSs, making it difficult to accurately compare the performance of the two different types of services (Mackey, et al., 2014). Another reason is that it is difficult to compare small-scale, localised studies with a broader study, such as the LSIC, as the context in which services are delivered can have a major bearing on health outcomes (Mackey, et al., 2014).

5.4 BREASTFEEDING

Breastfeeding has significant health benefits for both mothers and infants and has also been correlated with reductions in health conditions for which Indigenous Australians are overrepresented – such as hypertension, diabetes, respiratory infections, obesity, and some types of cancer (Binns et al., 2016). It is also globally recognised as the optimal method for feeding infants because it is linked to the child's survival, growth, and development (Victoria et al., 2016). As such, breastfeeding is widely used as a primary outcome in the literature when comparing ISPHCSs with mainstream services. There is evidence of the effectiveness of culturally appropriate indigenous-specific services increasing the rates of breastfeeding among Indigenous Australian women through consistent breastfeeding promotion, education, and support (AIHW, 2021c; Kildea et al., 2021; Smylie, et al., 2016).

The results of this thesis indicate that although a high percentage (79.55 per cent) of children included in the LSIC were breastfed, there was not a statistically significant difference between the odds of a child being breastfed and the medical service attended by the mother – either an AHS or a MHS. One of the possible reasons being that Indigenous Australian women value the knowledge regarding infant feeding that is passed onto them from extended family members and other women within their community (Helps & Barclay, 2015). Therefore, indicating that the AHSs may not have any influence on a mother breastfeeding if the individual giving the advice is not trusted and their knowledge not valued by the Indigenous Australian woman. Other possible reasons are that individual circumstances strongly influence infant feeding strategies and community strengths are underused in supporting breastfeeding mothers (Foley et al., 2013). Therefore, indigenous-specific services may have increased their support for breastfeeding mothers in more recent years, which would explain the discrepancy between the literature and the results of this thesis.

Chapter 6: Conclusions

This chapter starts with a brief summary and overview of the thesis, it then discusses the main findings based on the primary outcomes defined prior to analysis, next the limitations are discussed, and this is followed by the recommendations for future research.

6.1 SUMMARY AND OVERVIEW OF THE THESIS

Indigenous Australians have worse health outcomes than non-Indigenous Australians. This thesis focussed on the disparity in maternal and infant outcomes between Indigenous and non-Indigenous Australians. The literature highlights the importance of culturally appropriate care and ISPHCS to improve maternal and child health. In theory, ISPHCSs and ACCHCSs are more suited to treat the needs of Indigenous Australians and are thus more valued by Indigenous Australians, resulting in higher uptake of these services and therefore improving their health outcomes (Allen et al., 2020; Kelly et al., 2014; Mackey et al., 2014; Middleton et al., 2017; SCRGSP, 2020). Given that these services tend to provide more holistic and comprehensive care, one study has found that they also tend to be more expensive than mainstream services (Ong et al., 2012). Although it is important that Indigenous Australians are able to access culturally appropriate health services, from health economics and cost-effectiveness perspectives it is just as important that scarce resources are being used to improve the health of the Indigenous Australian population (Angell, 2017). However, there is conflicting evidence as to whether Indigenous Australians who attend ISPHCSs or ACCHSs have better, or even similar, clinical outcomes to those who attend MHSs.

This thesis aimed to address one of the biggest gaps that exists in the literature by identifying whether, based on the LSIC dataset, Indigenous Australians have better maternal and child health outcomes when they utilise AHSs as opposed to MHSs. There were seven primary outcomes, defined prior to analysis, based on the study child and their mother. These were mothers having regular pregnancy check-ups, mothers having their first check-up within the first trimester, mothers consuming alcohol or smoking cigarettes during their pregnancy, children being born preterm or with a low birthweight, and mothers breastfeeding the study child.

The purpose of this thesis was not to use the results to argue whether or not AHSs, and more broadly ACCHSs or ISPHCSs, should be funded or even exist. The theory is clear, these services are better suited to address the needs of Indigenous Australians. However, it is not clear whether this materialises into better clinical outcomes. As such, this thesis was a preliminary study to firstly determine how AHSs perform, compared to MHSs, in treating Indigenous Australians.

6.2 MAIN FINDINGS

There is no evidence of the medical service attended having a statistically significant influence on mothers having regular pregnancy check-ups or going for their first check-up within the first trimester.

There was also not a statistically significant difference in alcohol consumption or cigarette smoking between mothers who attended an AHS or a MHS, after adjusting for other significant factors.

Furthermore, the medical service attended did not have a statistically significant impact on children being born preterm but it did have a statistically significant impact on a child being born with a low birthweight. After adjusting for significant factors, the odds of having a baby with a low birthweight was 1.83 times greater if a mother attended an AHS for pregnancy check-ups in comparison to a MHS.

Lastly, although a high percentage of mothers included in the LSCI breastfed their child, there was not a statistically significant difference between the odds of women who attended AHSs or MHSs and having breastfed their child.

6.3 SIGNIFICANCE AND IMPLICATIONS OF THE FINDINGS

Overall, only one of the primary outcomes had a statistically significant difference, wherein there were higher odds of a child being born with a low birthweight if the mother attended an AHS as opposed to a MHS. The results of this thesis, therefore, indicate that based on the available data, AHSs do not result in better clinical outcomes for Indigenous Australians when compared to the outcomes of MHSs. This is in spite of the literature widely promoting AHSs as being more holistic and culturally appropriate and, therefore, more valued by Indigenous Australians. One of the possible reasons for these unexpected results is that AHSs may have a more complex caseload given they provide holistic care to their patients. The fact that the data is old might in itself hold the answer as to why there is this conflicting evidence. However, it may also be because the studies in the literature focus on individual AHSs rather than AHSs as a whole. Overall, the findings cannot determine why the evidence concludes that AHSs do not have better clinical outcomes, this is where further research is needed.

6.4 LIMITATIONS

6.4.1 Survey Questions

Another limitation is that the nature of the survey questions impinges on the quality of the results and inferences being made. Numerous survey questions were answered with a yes or no by the study child's parents with no criteria for answering. For example, one question was whether or not the mothers had regular check-ups during their pregnancy. However, a criterion was not provided as to what is considered a regular check-up, as such, it was up to each woman to interpret the question which, therefore, affects the accuracy of the results. It is not clear what influence this may have had on the findings, but future studies should consider this when collecting similar data.

6.4.2 Interpretation of the Results of the LSIC Data

The LSIC follows the same study children and their families over time. Therefore, the data on pregnancy and birth outcomes was only available in the first wave which was collected between April 2008 and February 2009 with the reference period for the 'baby' cohort being those children born between December 2006 and November 2007. Therefore, the data is not an accurate representation of the current situation for Indigenous Australians, which has improved in some respects over the past decade. As such, the results should be interpreted with this in mind. However, the findings remain relevant as to whether, at that time, those mothers who attended AHSs had better outcomes compared to those who attended MHSs. Additionally, the results are significant because, to the best of my knowledge, only small-scale localised studies have been conducted when comparing outcomes for AHSs and MHSs.

6.4.3 Comparing the LSIC Results with Other Studies

The existing literature includes small-scale, localised studies that compare clinical outcomes for Indigenous Australians who attended mainstream services with those who attended an ISPHCS. Whereas the results of this thesis are based on the LSIC which included eleven sites across Australia and tried to include a representative sample. Therefore, caution should be taken in the comparison of the results of this thesis with the existing literature, as the results of these small-scale studies cannot be generalised to all ISPHCSs (Mackey et al., 2014). As such, data on the national patterns and variations in the comparative effectiveness of mainstream services and ISPHCSs is needed.

6.5 RECOMMENDATIONS

The findings of this thesis are significant as they conflict with more recent studies which suggest that indigenous-specific medical services have better outcomes for Indigenous Australians. Therefore, further research needs to be undertaken to understand why some indigenous-specific services have better clinical outcomes for indigenous peoples whilst others do not. Such research is necessary to ensure these culturally appropriate services are providing care that can materialise into the best possible improvements to Indigenous Australians' health. This research is also important for funders and policy-makers to make resource allocation decisions.

Furthermore, given that the existing literature includes small-scale and localised studies, more data on the national patterns and variations in the comparative effectiveness of mainstream services and ISPHCSs is needed.

Overall, more extensive evidence on the strategies which are effective in improving health outcomes among Indigenous Australian families is urgently needed to inform policy, practice, and funding decisions (Kildea et al., 2021).

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