

**TRANSLATING RESEARCH INTO HEALTH
SERVICE DELIVERY**

“IT’S ALL IN THE TRANSLATION”

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SUMMARY

This thesis by published work investigates a population health approach to improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia. In Chapter 1, I describe the current poor health status for Aboriginal and Torres Strait Islander people living in remote Australia and the importance of the research question and this thesis. I also provide a commentary on the literature around the development of a population health approach to reducing health inequities. Chapter 2 provides an outline of my own epistemology, the methodology and the program logic model used to evaluate the series of case studies. The Community Health service Evaluation Framework (CHEF) tool is developed using the program logic model and enables a consistent and systematic analysis of each case study. Chapters 3 to 6 describe each of the programs implemented and presents them each as a case study. These case studies are arranged to progress from a single clinical intervention through to health service re-orientation. The CHEF tool analysis of each intervention case was used to identify common themes and effective attributes across the case series.

This thesis, identifies attributes of effective population health interventions implemented in remote Australia:

- Test evidence-based assumptions in context
- Maximise the population impact
- Address the social determinants of health using multiple-level strategies
- Integrate with existing services
- Align implementation epistemology, theory and evaluation methodology to ensure accountability for outcomes and
- Empower the community.

This complexity requires a systems approach to planning, monitoring and evaluation. The CHEF tool was presented as a conceptual tool for evaluating population health interventions in the context of remote Aboriginal and Torres Strait Islander health. Finally, I draw these findings together into a proposed comprehensive evaluation framework that brings together both change theory and systems theory when improving health outcomes in the rural and remote context. Change theory challenges us to consider how we can adapt the structure of the health system in order to enable the processes required to achieve the outcomes of the intervention. Systems theory informs the importance of taking into account the context as well as the many components of the complex system to achieve sustainability and improve effectiveness.

The papers in this thesis demonstrated that improvements in health outcomes for rural and remote Aboriginal and Torres Strait Islander people are possible with a comprehensive population health approach. The thesis contributes to the literature by developing an analysis tool that identifies common themes and attributes across the case studies.

Policy and practice implications

Strong local leadership can maximise the opportunities to translate evidence into improvements in health service delivery. Key factors:

- Importance of planning to align the intervention, theoretical model and evaluation in partnership with the local community
- Monitoring to inform the adaption to context and integration with existing services for efficiency and sustainability and
- Embedding research and evaluation in health service delivery to ensure the appropriate data is collected for the effective evaluation of both the

process and the impact.

- The successful translation of these population health interventions into rural and remote Aboriginal health service delivery, their subsequent evaluation through the CHEF tool and the attributes found to contribute to these contextualised interventions are new and potentially generalisable.

DECLARATION

I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief, it does not contain any material previously published or written by another person, except where due reference is made in the text.

Signed

Date 1st July 2015

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LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Service
AIHW	Australian Institute of Health and Welfare
CHEF	Context Health Service Evaluation Framework
CIHR	Canadian Institute of Health Research
CDC	Centers for Disease Control and Prevention
CSDH	Commission on Social Determinants of Health
COAG	Council of Australian Governments
FVHS	Fitzroy Valley Health Service
H4L	Healthy for Life
HPV	Human Papilloma Virus
KPHU	Kimberley Population Health Unit
OECD	Organisation for Economic Co-operation and Development
NACCHO	National Aboriginal Community Controlled Health Organisation
NHMRC	National Health and Medical Research Council
NHPA	National Health Performance Authority
NICE	National Institute for Health and Care Excellence
NCHS	Nindilingarri Cultural Health Services
RMOs	Resident Medical Officers
RSV	Respiratory Syncytial Virus
SNAP	Smoking, nutrition, alcohol and physical activity
UDRH	University Departments of Rural Health
WHO	World Health Organization

INDEX FOR APPENDICES

The following is a list of the publications forming the basis of each chapter around which this thesis by published work is built.

Case Study 1: RSV prophylaxis

Appendix 1a Reeve, C. A., Whitehall, J. S., Buettner, P. G., Norton, R., Reeve, D. M., & Francis, F. (2006). Predicting respiratory syncytial virus hospitalisation in Australian children. *Journal of Paediatric and Child Health*, 42(5), 248–252.

Appendix 1b Reeve, C. A., Whitehall, J. S., Buettner, P. G., Norton, R., Reeve, D. M., & Francis, F. (2006). Cost-effectiveness of respiratory syncytial virus prophylaxis with Palivizumab. *Journal of Paediatric and Child Health*, 42(5), 253-258.

Case Study 2: School-based HPV vaccinations

Appendix 2a Reeve, C., De La Rue, S., Pashen, D., Culpan, M., & Cheffins, T. (2008). School-based vaccinations delivered by general practice in rural north Queensland: An evaluation of a new human papilloma virus vaccination program. *Communicable Diseases Intelligence*, 32(1), 94–98.

Case Study 3: Expanding the role of paramedics

Appendix 2b Reeve, C., Pashen, D., Mumme, H., De la Rue, S., Cheffins, T. (2008). Expanding the role of paramedics in northern Queensland: An evaluation of population health training. *Australian Journal of Rural Health*, 16(6), 370–375.

Case Study 4: Indigenous Lifescritps

Appendix 2c Reeve, C., Pashen, D., Mumme, H., De La Rue, S. & Cheffins, T. (2008). Indigenous Lifescritps: A tool for modifying lifestyle risk factors for chronic disease. *Australian Family Physician*, 37(9), 750–751, 753–754.

Case Study 5: Ear health pathway

Appendix 3a Reeve, C., Thomas, A., Mossenson, A., & Davis, S. (2014). Evaluation of an ear health pathway in remote communities: Improvements in ear health access. *Australian Journal of Rural Health*, 22(3), 127–132.

Case Study 6: Management of type 2 diabetes – a community partnership approach

Appendix 3b Harch, S., Reeve, D., Reeve, C. (2012). Management of type 2 diabetes: A community partnership approach. *Australian Family Physician*, 41(1–2), 73.

Case Study 7: Community Participation to Strengthening Primary Health

Appendix 4a Reeve, C., Humphreys, J., Wakerman, J., O’Brien, T., Carroll, V., & Carter, M. ... Smith, B. (2015a). Community participation in health service reform: The development of an innovative remote Aboriginal health care service. *Australian Journal of Primary Health*. Published online January 29, 2015.

doi.org/10.1071/PY14073

Appendix 4b Reeve, C., Humphreys, J., Wakerman, J., Carroll, V., Carter, M., & Reeve, D. (2015b). Strengthening primary health care: Achieving health gains in a remote region of Australia. *Medical Journal of Australia*, 202(9), 483–487.

THESIS MAP

This PhD by published works uses a purposive sample of nine papers I have published over the past 10 years as part of my work as a doctor and public health physician. These papers were selected to illustrate the progression from a single clinical intervention to the complexity of health service reorientation, reflecting the public health impact pyramid described by Frieden (2010). Coincidentally, this progression also reflected the natural development and progression of my career over time.

Chapter 1 describes the inequitable health outcomes for Aboriginal and Torres Strait Islander people living in rural and remote areas, introduces the research question and describes my role as the researcher as an informed insider. The chapter then outlines the historical development of a population health approach as a response to improving health outcomes and health inequities; in particular, using the example of the Canadian experience before briefly outlining the Australian context during the time frame of this thesis.

Chapter 2 describes the foundational theories in population health research and the study epistemology and methodology, together with the rationale for using case studies and logic models. The methods used in the thesis and their rigour are outlined, including the data collection and analysis tool, and the adherence to appropriate ethical principles.

Chapter 3 introduces Case Study One, “Palivizumab Prophylaxis for Respiratory Syncytial Virus (RSV)” and illustrates a potential single clinical intervention using two published papers as the data. It also demonstrates the use of the data collection and analysis tool – the Context Health service Evaluation

Framework (CHEF) tool – which will be applied to each of the case studies. In this chapter I propose a number of themes regarding the attributes of successful population health interventions to improve health outcomes of Aboriginal and Torres Strait Islander people.

Chapter 4 describes long-lasting protective intervention strategies illustrated by three case studies; Case Study 2 “School-Based HPV Vaccination”, Case Study 3 “Expanding the Role of Paramedics” and Case Study 4 “Indigenous Lifescrpts”. The results, analysis and lessons learnt from each case are outlined and collated. I then review and build on the themes from Chapter 3.

Chapter 5 presents models of care for single diseases as a strategy for changing the health context using Case Study 5 “An Ear Health Pathway” and Case 6 “Management of Type 2 Diabetes – A Community Partnership Approach”. I then expand on the themes from Chapter 4.

Chapter 6 takes changing context one step further through reorientation of the whole health service using community participation in health service reform as the final cases study. I then refine the emerging themes from the case series.

The final chapter summarises the themes and conclusions drawn from the case study series and describes their policy and practice implications for improving the health outcomes of Aboriginal and Torres Strait Islander people living in rural and remote areas of Australia. These findings are then considered further in the context of contemporary population health literature and how they may also apply to First Nations people of other countries and to health inequities due to marginalisation in other situations.

Chapter 1: Background

1.1 Introduction

This thesis by published work answers the research question “What attributes of the population health interventions described are effective in improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia”. The chapter summarises briefly the current poor health status for Aboriginal and Torres Strait Islanders living in rural and remote areas and the historical background to population health and how this has led to contemporary thinking around addressing health inequities.

I explore seven population health programs that I led using case study methodology to answer the research question. I identify common themes across the case series to determine their effect on these interventions, the processes by which they bring about change and the contexts within which they work (Hawe & Potvin, 2009).

Finally, I discuss the findings and explore the implications of the findings for policy and practice. This research contributes to filling the evidence gap around empirical health interventions using a population health approach to improve health equity for Aboriginal and Torres Strait Islander people living in rural and remote areas of Australia.

The thesis draws on: Australian and international literature, nine papers authored by me (Reeve), my experience delivering public health interventions and primary health care services, and finally reflection on my experience of evaluating health interventions over the past 10 years.

1.2 Background

In this chapter I present the poor health outcomes for rural and remote and Aboriginal and Torres Strait Islander people to demonstrate the importance of the thesis. I clarify the research question and situate myself as researcher and informed insider. I then describe the historical background of population health in the international and Australian context to set the scene for a description of the research design for this thesis by post-hoc publication.

1.3 Importance of the Research Topic

Health inequalities describe objective differences in health outcomes that are unequal, for example, the difference in breast cancer rates between men and women. Health inequity is a values-based judgement most commonly defined as differences in health outcomes that are unjust or unfair and avoidable (Krieger, 2001). This requires a judgement statement around injustice or unfairness; although the concept of health equity is present across societies the value placed on it varies depending on the population questioned and the group suffering the health inequalities (Macinko & Starfield, 2002). In Australia, the largest health inequities are found in rural and remote areas and particularly for Aboriginal and Torres Strait Islander people.

1.3.1 Poorer Health Outcomes for Rural and Remote People

Australian national level data disguises clear health inequities for people living in rural and remote areas. Life expectancy is a key measure of the overall health of a population. The average mortality rate in Australia, in 2009, was among the lowest of all Organisation for Economic Co-operation and Development countries at 687 deaths per 100,000 population (OECD, 2013). If we look at the distribution, however, death rates increase with increasing remoteness. In 2012, the age-standardised mortality rate was highest in very remote areas (8.4 per 1,000

population), followed by remote (6.7), outer regional (6.4), inner regional (6.1) and major cities (5.5) (Figure 1.1). People living outside Australia's major cities have worse outcomes on leading health indicators.

Australia is a very large country with a relatively small population of over 23 million people (ABS, 2013a) and the long distances and sparse population are major challenges for providing health services in rural and remote locations. The phenomenon of inverse care for patients with the greatest need described by Tudor Hart more than 40 years ago (Tudor Hart, 1971) still exists today with the highest concentration of health professionals based in major cities (AIHW, 2014a).

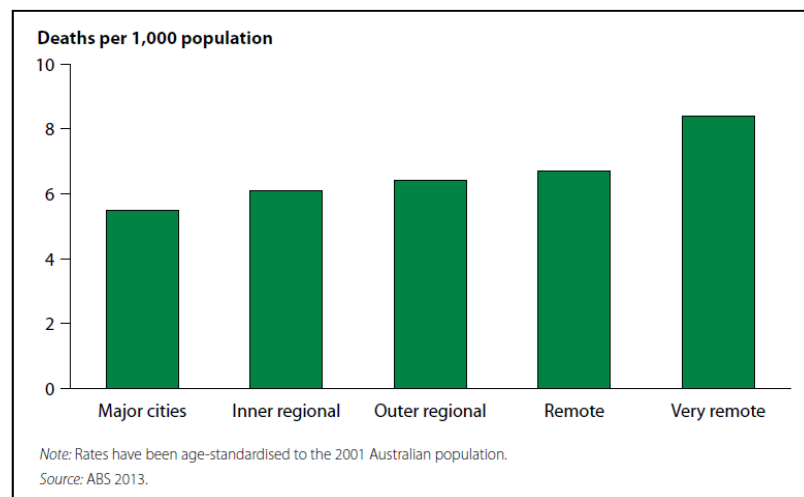


Figure 1.1 Age-standardised death rates by remoteness 2012.

Source: Australian Bureau of Statistics (ABS) 2013

Key reasons for these poor health outcomes outside of major cities are decreased access to services, including health care, poorer socioeconomic determinants of health and increased exposure to risk factors for poor health outcomes (AIHW, 2012). People living in remote areas have decreased access to educational and employment opportunities, income and goods and services (AIHW,

2014a). Many studies have also demonstrated that Australians living in remote or very remote areas experience higher rates of risk factors for chronic disease and illness such as tobacco smoking, obesity and risky alcohol consumption (AIHW, 2014a). In rural, and especially remote areas, there is strong evidence that poor access to primary health care remains a critical barrier and is reflected in the high rate of potentially preventable hospitalisations (Council of Australian Governments (COAG) (COAG, 2013; Page et al., 2007).

The precise relative contributions of these factors on health outcomes in remote areas is difficult to determine due to the interactions between the many different but related risk factors. It is estimated that socioeconomic factors have the largest impact on health, accounting for up to 40% of all influences, compared with health behaviours (30%), clinical care (20%) and the physical environment (10%) (The British Academy, 2014). Limited availability of health data in regional and remote areas, and exclusion of very remote areas are from some analyses because data are not available or of sufficient quality compound our poor understanding of health inequities in rural and remote Australia (AIHW, 2014a).

1.3.2 Poorer Health Outcomes for Aboriginal and Torres Strait Islander Health

The health of Aboriginal and Torres Strait Islander people is generally worse than for non-Indigenous Australians across Australia. In rural and remote areas Aboriginal and Torres Strait Islander people suffer the additional burdens of increased socioeconomic disadvantage and poorer access to health and other services. Remote areas of Australia are disproportionately populated by Aboriginal and Torres Strait Islander people, census data in 2011 showed that almost half (45%) of all people in ‘Very remote’ areas and 16% in ‘Remote’ areas were Aboriginal and Torres Strait

Islander people as compared with 3% Aboriginal and Torres Strait Islander people in the total population (ABS, 2013b; ABS, 2011). Rural and remote Aboriginal populations experience health inequities compared to the rest of Australians (AIHW, 2010) due to the impact of the social determinates of health as depicted in the framework in Figure 1.2. This model defines the structural determinants of health inequities as the socioeconomic and political context which in turn impacts the economic opportunities, social cohesion and social capital of Aboriginal and Torres Strait Islander people and determines the intermediary social determinants of health.

Figure 1.2 **Figure has been removed due to Copyright restrictions.**

Conceptual framework highlighting social determinants of health inequity.

Source: Awofeso, N (2011)

Poorer health outcomes for Aboriginal and Torres Strait Islander people are reflected in differences in life expectancy. Life expectancy at birth for Aboriginal and Torres Strait Islander people in 2010–2012 was 73.7 years for females and 69.1 years for males, compared with 83.1 and 79.7 years for non-Indigenous females and males respectively (ABS, 2013c).

Aboriginal people have higher rates of chronic and preventable illnesses and a higher likelihood of being hospitalised than non-Indigenous Australians (AIHW, 2013b). These differences in health start at birth with low birth weights and continue throughout life (ABS, 2011). Self-reported health is also poorer, (only 39% of Indigenous Australians rated their health as ‘excellent’ or ‘very good’, 36% as ‘good’, 18% as ‘fair’ and 7% as ‘poor’ in 2012–13; ABS, 2013b).

Aboriginal and Torres Strait Islander people experience social disadvantage in relation to poor housing, overcrowding, education, income and employment in rural and remote areas leading to a negative impact on health (AIHW, 2014a). These socioeconomic risk factors result in chronic diseases such as cardiovascular disease, diabetes, mental disorders and chronic lung disease (Vos et al., 2007). The impact of these social determinants are estimated to contribute to between one-third and two-thirds of the gap in health outcomes for Aboriginal and Torres Strait Islander people (Booth & Carroll, 2005; DSI Consulting Pty Ltd & Benham, 2009; Zhao et al., 2013). Additionally, very remote Aboriginal communities are influenced by environmental or geographical factors such as long distances to access services, communities being cut off due to flooding, and poorer access to healthy food sources (Harrison et al., 2010; Humphreys & Wakerman, 2008).

Aboriginal and Torres Strait Islander people are disadvantaged compared with other Australians, across almost every health risk factor. The largest differences for Aboriginal and Torres Strait Islander people are in smoking status, psychological distress, and cardiac/circulatory diseases. The one indicator in which the rates are lower is for overweight/obesity in regional and remote areas (AIHW, 2014a).

Many Aboriginal and Torres Strait Islander people experience problems accessing timely and appropriate health services which may be exacerbated by a lack of culturally appropriate services (ABS, 2013b). In rural, and especially remote areas, there is strong evidence that poor access to primary health care remains a critical barrier, particularly for Aboriginal and Torres Strait Islander people, and is reflected in the high rate of potentially preventable hospitalisations (Council of Australian Governments [COAG], 2013; Page et al.; Thomas et al., 2014; Zhao et al., 2014).

Despite significant policy efforts and investment in rural and remote Aboriginal health services over the past decade considerable inequity persists. In 2010–11, the total amount spent on health goods and services for Aboriginal and Torres Strait Islander people was estimated at \$4.6 billion, or 3.7% of Australia’s total recurrent health expenditure. This equated to \$7,995 per Aboriginal and Torres Strait Islander person, which was around 1.5 times the \$5,437 spent per non-Indigenous Australian in the same year (AIHW, 2014a). This investment has led to some improvements. From 1998 to 2013 the overall Aboriginal and Torres Strait Islander death rates declined significantly by 16% and there was a significant decline in the gap (by 15%). However, no significant change was detected between the 2006 baseline and 2013. Figure 1.3 shows that death rates are not on track to reach equity and the current rate of progress will have to gather considerable pace if that target is to be met by 2031 (Department of the Prime Minister and Cabinet, 2015).

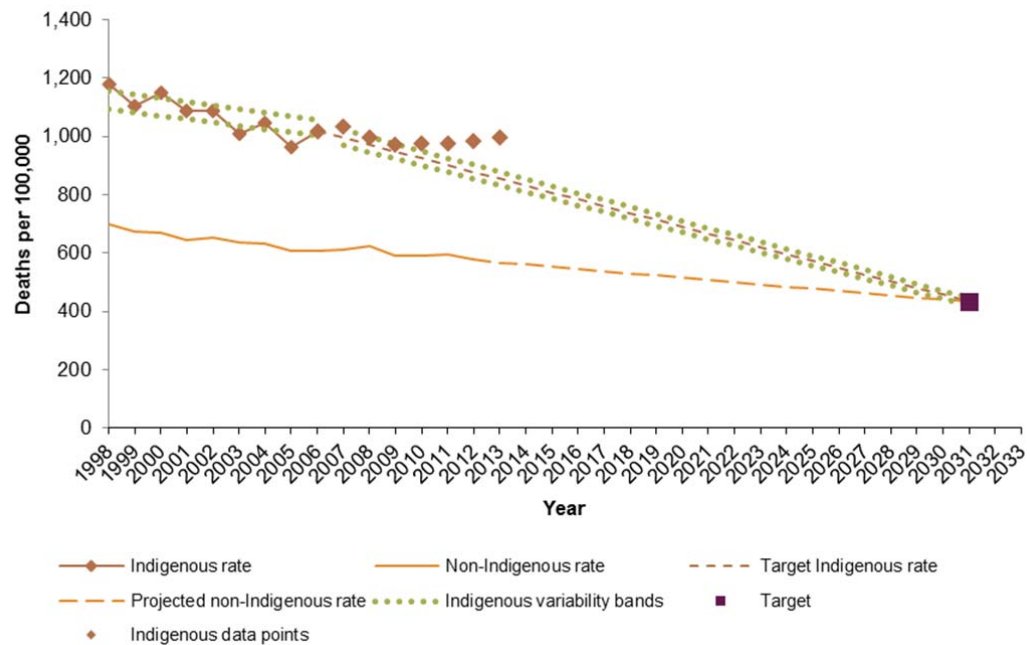


Figure 1.3 Overall mortality rates by Indigenous status: NSW, QLD, WA, SA and the NT combined 1998–2031.

Source: ABS and AIHW analysis of National Mortality Database from Closing the Gap report 2015.

There are several potential sources of error when calculating Aboriginal and Torres Strait Islander mortality. It is likely that the identification of Indigenous status in death records is incomplete, there are delays in notification and there have also been recent changes to the way death rates are calculated (ABS, 2014). In the 2011 Census, the ABS revised its estimates of life expectancy of Indigenous people (ABS, 2013c). The levels of under-identification, which differed by age-group, jurisdiction and remoteness of residence, were taken into account for the new estimates of Indigenous life expectancy. The ABS noted that correction of the under-estimates of death numbers and rates would need similar adjustments (ABS, 2014).

Additionally, comparison of Indigenous and non-Indigenous mortality needs to take account of differences in the age structures of the Indigenous and non-Indigenous populations using age standardisation and there have been some inconsistencies in the way different government agencies calculated age-standardised rates in the past. Prior to 2011 some standardised death rates were calculated using the indirect method and are therefore not directly comparable. Direct standardisation, the preferred method, applies detailed information about Indigenous deaths, including sex and age, to a 'standard' population (AIHW, 2011a). In Australia, the 2001 Australian estimated resident population (ERP) is generally used as the standard population.) Direct standardisation enables accurate comparisons of Indigenous and non-Indigenous rates, and time-series analyses. However, caution should be exercised in the interpretation of the estimates of Indigenous mortality, particularly estimates of trends over time (ABS, 2014).

Taking these factors into account, I interpret Figure 1.3 as still demonstrating poor progress towards reducing health inequities for Aboriginal and Torres Strait Islander people, particularly in rural and remote Australia. Explanations for the gap in health outcomes include the fact that changes in health outcomes are influenced by external factors outside of health, particularly for disadvantaged and vulnerable populations. Improvements in health outcomes take time and some effects are generational. There have been some improvements in quality of care activities and health service usage or process indicators, which are expected to result in improved health outcomes in the future (AIHW, 2014a; AIHW, 2014b; Dwyer et al., 2004). The relationship between health service access, social disadvantage and the resulting health behaviours are complex and cause significant inequity in health outcomes for Aboriginal and Torres Strait Islander people, particularly in rural and remote areas.

1.4 Research Question

Having demonstrated the significant inequities in health outcomes for rural and remote Aboriginal and Torres Strait Islander people and the limited success in reducing this gap, this thesis aims to add to the evidence base around effective approaches to improve health outcomes for Aboriginal people living in rural and remote Australia. This thesis investigates the implementation and evaluation of a series of community-based population health interventions in which the author had a central contributing role. The broad research question addressed in this thesis is “What attributes of population health interventions are effective in improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia.

Population health has been acknowledged as a strategy for reducing health inequities, healthcare demand and increasing health system sustainability (Bauer,

2014; Berwick et al., 2008; Cohen, 2014). This research question also enables me to draw on my expertise developed through ten years of “real world” implementation of programs to improve health outcomes, and embedding research and evaluation into routine health service delivery and practice. This integrated role of population health provision and evaluation is recommended in the McKeon Report (McKeon, 2013).

The research question has direct applicability to current public health policy and practice in Australia. It provides evidence of effective interventions and an analysis to increase the understanding of ways to improve health outcomes of Aboriginal and Torres Strait Islander people. Important audiences for this research include: rural and remote health practitioners, rural and remote health service managers and policymakers with the responsibility of improving health outcomes in Australia. This research has been published in key journals for rural and remote health practitioners and has been presented at policy meetings in Canberra to leading politicians and policy makers in the Department of Health. The author has also presented the findings at stakeholder meetings in Western Australia and in keynote addresses at peak national conferences in Australia and internationally (Reeve 2014, Reeve 2015).

The findings and key principles of the thesis however, have relevance to a wider audience of practitioners, managers and policymakers in other countries addressing the challenge of improving health outcomes for vulnerable rural and remote populations. I continue to work to translate the key messages identified in this theses and my other public health research work to identified audiences through ongoing Northern Territory, Australian and international representation and advocacy work including engagement in Training for Health Equity Network meetings and Commonwealth Government Committees such as the NMTAN subcommittee on

changing clinical work with the changing burden of disease.

1.5 Researcher as Informed Insider

As the author of this thesis, I have been involved in the research in at least four ways:

1. As author of the thesis
2. In developing and applying the tool to conduct case studies to reflect on the strengths and weaknesses of the interventions.
3. As part of a team who developed the original evaluation tool and protocol/evaluation method that is being used for the case studies.
4. As part of a number of teams who conducted the original population health interventions that led to the publications that are the subject of the case studies that make up the thesis.

In order to be transparent about these roles, and to assist the reader in clarify what role I am reporting within the thesis, I write this article in the first person in the present tense. I use this tense to make explicit the case study synthesis occurring as part of this thesis (as outlined in items 1 and 2 above). I refer to my work in the cases and publications included in this thesis in the third person (Reeve) in the past tense to make explicit the collective work of Reeve and others in implementing and evaluating the interventions in the case studies described. Further justification for this choice to use both first and third person voices for reporting is outlined below and enlarged on further in Chapter 2.

Empirical scientific research favours the use of what is seen as objective, quantitative measurement, founded in a positivistic paradigm (Crotty, 1998). This is the paradigm largely used in the original published research. The quantitative approach used in the original research articles determined whether the case studies in

this thesis were effective interventions while the analysis of the case studies using the CHEF tool enabled the identification of effective attributes across the interventions to be synthesised to answer the research question. This mixed methods approach to answering research has been suggested as an effective way of integrating research into evidence-based practice (Greenhalgh, 2002).

Over the past 10 years Reeve has applied population health principles from the literature and translated them into service delivery with the goal of reducing the health inequities of Aboriginal and Torres Strait Islander people in rural and remote communities. Her role changed from working in newborn intensive care at the Townsville Hospital to working as a General Practitioner in Aboriginal Medical Services. As a consequence, she moved from a very medical inpatient model of individual patient care to a primary health care model providing care for a population of patients. Finally, as a regional public health physician, she had a more comprehensive role of implementing and evaluating multiple public health and primary health care programs across a region, culminating in the comprehensive monitoring and evaluation of the Fitzroy Valley Health Service.

The role of the researcher in qualitative research is different from that in quantitative research, the qualitative researcher uses their personal knowledge and experiences to make sense of the data when coding and analysing (McCracken, 1988). Qualitative research has the objective of interpreting or understanding events in their natural settings and to develop conceptual frameworks about social phenomena (Fossey et al., 2002). The final report or conclusions will also be interpreted through the researcher's world view and contain their interpretation of the data (Fink, 2000) and therefore never be completely objective.

This research project reflects the real-life experience of myself as the

researcher. I have worked in rural and remote health since 1996. Not only in Australia but I also spent 2 years in a very remote district hospital in Tanzania. This was a transformative experience leading to the change in career from acute hospital medicine to primary care and public health in rural and remote areas. During the 10-year period covered by this thesis I have had full responsibility for the implementation and evaluation of the interventions, including supervising and mentoring the implementation teams involved in service delivery and evaluation. I bring this perspective to the analysis of the case studies and the synthesis of the literature in the introduction and to my perspective of the historical background and current position of population health.

1.6 Population Health

1.6.1 Historical Background

Traditional public health emerged in the late 18th century largely as a response to the disastrous health effects of the Industrial Revolution. The focus was largely on infectious disease prevention with a strongly epidemiological biomedical science methodology and the key strategy was a legislative approach to sanitation and hygiene (Szreter, 2003). Over the next couple of centuries, particularly after the Second World War, this approach widened to include not only sewage and water but more social and political interventions. For example, the sealing and cleansing of roads, better housing, regulation of the urban food supply and environment, enhanced social security measures and the provision of widely accessible public health services (Szreter, 2003).

More recently the concept of a population health approach has evolved from dissatisfaction with traditional public health and the limitations of a strongly

individual-orientated biomedical methodology. There is a desire for a more comprehensive approach towards social medicine and the World Health Organization's (WHO) broader approach to health (Cochrane, 1972; Lalonde, 1947; WHO, 1978) as not merely the absence of disease. In order to meet the challenges of the transition from a largely acute infectious burden of disease to the increased complexity of chronic disease and its risk factors we need to look not just at the analysis of risk factors in individuals. The sociological and ecological influences on health also need to be taken into account. This requires a theoretical framework that encompasses a role for the social determinants of health, while simultaneously acknowledging the importance of behaviour and biology, and the interconnectedness of all these factors (Ansari et al., 2003). This approach recognises the impact on health of the many socioeconomic determinants of health (Evans et al., 1994). This approach combines aspects of traditional public health and epidemiological science with a synthesis of ethics, politics, social capital, human security, the ecological and biological sciences and health economics (Szreter, 2003). An important aspect is the ability to look at the distribution of health across populations including health equity and the underlying ethical issues and values involved (Dowie, 1999).

1.6.2 A Population Health Approach

The population health approach is becoming increasingly recognised for its role in reducing healthcare demand and in contributing to health system sustainability (Suter et al., 2009). There is no consensus around the precise definition of population health, despite its widespread use and the proposal of a definition in 2003 differentiating it from public health, health promotion, and social epidemiology (Kindig & Stoddart, 2003). This lack of clarity has resulted in confusion and very different assumptions of what the concept means, ranging from whether it is a field

of study or a concept of health as an aspirational goal. For the purposes of this thesis, and in the absence of agreed alternatives, I will use the schematic definition proposed by Kindig & Stoddart (2003) as shown in Figure 1.5. This definition describes population health as a field of study to measure the impact of interventions on the aspirational goal of equitable health outcomes across a population. A population health approach focuses on achieving improvements in health outcomes, “including the distribution of such outcomes within the group” through “policies and interventions” and looks at the interactions between “the patterns of health **Health Interventions** determinants” and their impact (Kindig & Stoddart, 2003).

Figure 1.4 **Figure has been removed due to Copyright restrictions.**

A schematic definition of the field of population health.

Source: Modified from Kindig & Stoddart (2003, p. 382.)

Population health therefore has dual goals: to both improve the health outcomes of the whole population and to increase health equity across the population. These goals seek to improve mean population outcomes and importantly, reduce the range of outcomes across the population by identifying high risk and vulnerable populations. As Australia has some of the highest mean population health outcomes in the world (OECD, 2013), the priority and scope for this thesis is the health outcomes for Aboriginal and Torres Strait Islander people in rural and remote areas.

A population health approach has been an explicit strategy for health service delivery in Canada since the 1970's (Cohen et al., 2013) and has now been adopted by the United States of America as an integral component of their “Triple Aim” approach (Beswick, 2008). Although other population health models exist in the literature I chose the population health model used in Canada as a conceptual model

for this study as it aligned closely to my own experiences and previously developed perspectives of population health.

1.7 The Canadian Population Health Experience

The health of Indigenous peoples or First Nations peoples in First World countries as measured by life expectancy, is significantly worse than that of the mainstream populations of those countries. For example, in New Zealand, Canada, and the United States the indigenous people suffer from poorer health, with an excess of early mortality and lower life expectancy when compared to the non-indigenous population (Bramley et al., 2004). In New Zealand, the gap between Māori and non-Māori life expectancy in 2010–12 was 7.3 years (Statistics New Zealand, 2013). One study (Blakely et al., 2006) found that socioeconomic factors accounted for around one-third of the mortality difference between Māori and non-Māori. Using life expectancy as the measure of health, the indigenous population of Australia is significantly more disadvantaged than those of Canada, New Zealand or the United States (Griew et al., 2008).

Early adoption of a population health approach may have contributed to Canada achieving a narrower gap in life expectancy between First Nation and Canadian people than New Zealand, the United States or Australia. Life expectancy differences between First Nation and Canadian men was 7.4 years in 2000, while for women it was 5.2 years (Health Canada, 2002; Health Canada, 2004).

Canada has an extensive history in the development of the population health approach as evidenced by the Lalonde Report, *Achieving Health for All: A Framework for Health Promotion* and the Ottawa Charter for Health Promotion. (Lalonde, 1974; Epp, 1986; WHO, 1986). A population health approach, as a strategy for improving health outcomes, has been used extensively in Canada and

key documents have their roots in the Population Health Program of the Canadian Institute for Advanced Research (Evans et al., 1994.) Their approach is summarised below:

As an approach, population health focuses on the interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applied the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations. (Canadian Federal, Provincial, Territorial Advisory Committee on Population Health) (Public Health Agency of Canada, 2012)

A population health approach recognises that health is a capacity or resource rather than a state, a definition that corresponds with the notion of being able to pursue one's goals, to acquire skills and education, and to grow towards one's potential. This broader notion of health recognises the range of social, economic and physical environmental factors that contribute to health and enable aspirations and personal potential to be achieved. (Frankish et al., 1996). This definition includes the concepts of self-determination, self-actualisation and empowerment – not just physical health, acknowledging that they are an integral component of good health. Embedded within this concept of population health is an implicit set of values and beliefs (Cohen et al., 2014), some of these beliefs around self-determination and equity may have contributed to improved health outcomes in countries that have formal treaties with their indigenous populations (Wyeth et al., 2010). The template developed by the Public Health Agency of Canada is included here to illustrate how a population health approach can be operationalised and what the important

principles are when applied to health service delivery.

Figure 1.5 **Figure has been removed due to Copyright restrictions.**

Population health template.

Source: available at http://www.phac-aspc.gc.ca/ph-sp/pdf/overview_handout_black-eng.pdf

1.7.1 Key Elements

1. Focus on the health of populations

A population health approach aims to improve and maintain health across a defined population (Kindig & Stoddart, 2003; Shortell, 2013) and includes everyone in the population, not just the individuals actively engaging the health system (Sox, 2013). It requires a detailed epidemiological understanding of the health issues and health status of all groups within the population through the use of key health indicators, and consists of both the clinical health system and the public health system.

2. Address the determinants of health and their interactions

The WHO describes a ‘social gradient in health’ which shows that, in general, the lower an individual’s socioeconomic position the worse their health. Where people are in the social hierarchy affects the conditions in which they grow, learn, live, work and age, their vulnerability to ill health and the consequences of ill health (WHO, 2014a). The World Health Organization’s Commission on Social Determinants of Health concluded that social inequalities in health arise because of inequalities in the conditions of daily life and the fundamental drivers that give rise to them: inequities in power, money and resources (Marmot, 2009). This approach examines not just the biomedical factors but also the pathways linking the determinants of health to population health outcomes and their effects over the

lifespan and developing strategies for improvement (Kindig et al., 2008). The socioeconomic determinants of health can only be addressed by the combined involvement of all government sectors including: education, employment, housing, health, and environment.

3. Bases decisions on evidence

This element uses the best evidence available at all stages of policy and program development. Since 2005, the National Institute for Health and Care Excellence (NICE) has provided public health guidance (defined as preventing disease and promoting health) using the questions: is the public health action effective, and is its deployment a good use of public funds (Kelly et al., 2010).

This is an important aspect of a population approach to compare the cost-effectiveness of interventions to take into account the opportunity cost of any choice made and thereby ensure the best use of a finite set of resources.

4. Apply multiple strategies

A population health approach requires programs to prevent, detect and treat disease and its risk factors over a lifespan, as well as single one-off medical interventions for high-risk or sick individuals. This approach is described by the Ottawa Charter, which highlights the essential requirements of using multiple strategies for sustainability and effectiveness over the long term and exemplified in successful approaches to tobacco use (WHO, 1986).

The key principles of the Ottawa Charter are supported by five strategies:

- Build healthy public policy
- Create supportive environments for health
- Strengthen community action for health

- Develop personal skills, and
- Re-orient health services. (World Health Organization, 1986)

These principles and strategies have been most extensively applied to health promotion and, to a lesser degree, to primary health care. This ability of the Ottawa Charter to integrate systems approaches to health with behaviour and lifestyle factors (Baum, 2003) highlights the importance of multiple strategies for individuals and communities, including addressing policy issues and health services themselves. This approach uses multiple strategies, including a combination of policy development, legislation, organisational change, education, advocacy and community development (Keleher, 2007; Tones & Green, 2004).

5. Employ mechanisms for public involvement

A key element of a population approach is community participation, leadership and empowerment. Communities should be considered an integral component of health systems and have a clear role in identifying appropriate outcomes and defining success (South & Phillips, 2014). In addition, evaluation should include the relationship between community engagement and the determinants of health and identify improvements in people's control over their lives and health (Kickbusch & Gleicher, 2012; WHO, 2011). For Green and colleagues (2000) the empowerment component is critical (Green et al., 2000).

6. Collaborate across sections and levels

Health in all Policies is a mechanism for governance and implementation based on the understanding that the social determinants of health can only be addressed by the combined involvement of all government sectors – education, employment, housing, health, and environment (WHO, 2010a). A Health Equity in All Policies

approach is required to address the underlying systematic political determinants of health (WHO, 2014b). The challenge is to ensure this approach is: cross-sector, holistic, integrative and policy-led with popular support leading to individual empowerment. This collaborative approach requires a common vision of greater health, wellbeing and equity to be adopted by all sectors of government and accountability to achieve it (American Public Health Association, 2010).

7. *Increase upstream investments*

Primary health care is the foundation of health system and requires:

- sophisticated understanding of health promotion that reflects the Ottawa Charter
- a focus on reducing demand and resist pressures to increase supply
- rewards prevention of disease rather than treatment of cases
- a plan to shift dollars from hospital to community and from cure to prevention and promotion (Baum et al., 2009)

8. *Demonstrate accountability for health outcomes*

A population approach focuses on equitable health outcomes as key indicators of effectiveness to determine the success and ensure accountability of programs. This is achieved by evaluating the degree of change attributable to the intervention.

1.8 The Australian Experience

The first attempts to improve health inequities for Aboriginal and Torres Strait Islander people in Australia using a population health approach largely focused around self-determination and the development of community-controlled health

organisations. Although the right of communities to participate in the planning and implementation of their health care was articulated in the Alma-Ata Declaration (WHO, 1978), there is a paucity of literature demonstrating tangible impact on health outcomes (Bath, 2015).

In Australia, Community Controlled Health Services were developed as a strategy to achieve the population health aspirational goal of health equity for Aboriginal and Torres Strait Islander people. The first Aboriginal Community Controlled Health Service (ACCHS) opened in Redfern, Sydney in 1971. Since then similar services have been established throughout the country in recognition of Aboriginal and Torres Strait Islander people's perceptions that mainstream health services were not meeting their needs. ACCHS provide culturally appropriate holistic care with Aboriginal and Torres Strait Islander people controlling the organisations. ACCHS operating structures comprise Aboriginal and Torres Strait Islander community representation on management boards and services are directly accountable to the community. To demonstrate improved health outcomes, collaboration and consultation in the development of programs and projects in Aboriginal and Torres Strait Islander health must occur through mechanisms determined by the Aboriginal and Torres Strait Islander community. Primary medical care is delivered alongside preventive health programs and in collaboration with other health care providers using key aspects of a population health approach.

There have been a series of Government policies designed to improve health outcomes for Aboriginal and Torres Strait Islander people using a population health approach over the past decades (Humphreys & Gregory, 2012). Most recently, during the time period covered by this thesis the predominant policy has been "Closing the Gap". In 2008, there was a call for "the Government of Australia and

Aboriginal and Torres Strait Islander peoples of Australia to work together to achieve equality in health status and life expectancy between Aboriginal and Torres Strait Islander people and non-Indigenous Australians by the year 2030” (Calma, 2009; Black & Richards, 2009). This policy led to government strategy initiatives and significant investment to improve health outcomes. The “Closing the Gap” policy acknowledges that key underlying factors contributing to the inequity in health outcomes for rural and remote Aboriginal and Torres Strait Islander people are poor socioeconomic circumstances. The policy’s three priority strategies are (a) getting children to school, (b) getting adults into work, and (c) making communities safer for people to live, work and raise their families (Department of the Prime Minister and Cabinet, 2015). The establishment of the Indigenous Australians’ Health Programme in 2014 and the National Aboriginal and Torres Strait Islander Health Plan complemented the Indigenous Advancement Strategy to target maternal and child health and chronic disease (Department of the Prime Minister and Cabinet, 2015). These investments recognise the need for increased access to services, including health services for Aboriginal and Torres Strait Islander people.

Government policy has encouraged a population health approach to be applied to mainstream primary health in Australia through targeted professional development activities rolled out by Divisions of General Practice and later Medicare Locals, as well as practice incentive payments to general practice clinics. Population health in general practice has been defined as:

The prevention of illness, injury and disability, reduction in the burden of illness and rehabilitation of those with a chronic disease. This recognises the social, cultural and political determinants of health. This is achieved through the organised

and systematic responses to improve, protect and restore the health of populations and individuals. This includes both opportunistic and planned interventions in the general practice setting. (Department of Health and Ageing, 2003).

This definition has been used in the development of the curriculum of both the Australian College of Rural and Remote Medicine and the Royal Australian College of General Practitioners. The inclusion of population health in training for health professionals is seen as a means of investing in and embedding this approach in future health service delivery.

The importance of community empowerment and self-determination in improving health outcomes has been highlighted in the “Recognise Health” initiative that promotes understanding of the important link between health and wellbeing and constitutional recognition of Aboriginal and Torres Strait Islander people. The initiative has brought together a coalition of 117 non-government organisations across the Australian health system to date, including most professional colleges (Lowitja Institute, 2014).

1.9 Summary

This chapter demonstrates the importance of the research question ““What attributes of the population health interventions described are effective in improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia” by demonstrating that rural and remote Aboriginal and Torres Strait Islander people have the worst health outcomes in Australia. Chronic disease and the associated risk factors are responsible for approximately two-thirds of the life expectancy gap. Health outcomes reflect the cumulative effect of experiencing both

the disadvantage of living in rural and remote areas and the additional disadvantage experienced by Aboriginal and Torres Strait Islander people across Australia.

Recognition of these inequities led to government policy initiatives and significant investment to improve health outcomes, most recently “Closing the Gap”. The “Closing the Gap” policy acknowledges that key underlying factors contributing to the inequity in health outcomes for rural and remote Aboriginal and Torres Strait Islander people are poor socioeconomic circumstances. These investments also recognise the need for increased access to services, including health services for Aboriginal and Torres Strait Islander people. Despite initial progress there has been little improvement in life expectancy for Aboriginal and Torres Strait Islander people over the past 6 years.

This chapter sets the scene for the thesis by drawing on the literature to demonstrate that a population health approach aims to improve health outcomes of the whole population, but importantly also seeks to rectify health inequities by reducing the gap between advantaged and less advantaged groups. Although a population health model of care is being adopted in Canada and other countries including Australia, there remains a gap in the systematic analysis of interventions for Aboriginal and Torres Strait Islander people.

My expertise in the discipline of population health enables me, as a researcher, to bring the perspective of an informed insider to this thesis which explores a collection of population health interventions for improving rural and remote health service delivery by Reeve and others. Chapter 2 describes the methods used to evaluate a series of interventions through using a case study approach.

Chapter 2: Research Design

2.1 Introduction

Recognising both the need to improve health outcomes for Aboriginal and Torres Strait Islander people, and the potential value of a population health approach, I designed a study to answer the research question “What attributes of population health interventions are effective at improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia?”, drawing on my publications and expertise in this field. This chapter describes foundation theories in population health research, situates these in contemporary theoretical perspectives and considers the key ethical issues of working in the field of Aboriginal and Torres Strait Islander health. Finally, this chapter outlines the methods used in this thesis recognising that a requirement of a PhD by post-hoc publication is that the thesis will draw only on the previous publications by the candidate. This chapter also demonstrates how the research design establishes the field of knowledge (in real-life interventions) in remote health services. Analysis of cases using the CHEF logic tool provides a consistent approach to analysis and demonstrates common themes between publications. Finally in this chapter I critique the rigour of the methods described.

2.2 Foundation Theories in Population Health Research

Historically, there has been a complex evolution of health disparities research which, when simplified, can be considered as three generations of foci: detecting, understanding and providing solutions (Edwards, 2012, Kindig & Stoddart, 2003; Thomas et al., 2011). These have all contributed to the current generation (fourth phase) of thinking around strategies for reducing health inequities. These phases of

thinking will be described briefly to provide background and context.

2.2.1 Phase 1 – Detecting Health Inequities

Health inequities were first described as due to socioeconomic disadvantage (traditionally income, education and occupation), including social discrimination in terms of race, gender, disability or other differences for example rural or remote populations. These led to the identification of the social determinants of health and their impact on health outcomes. (Braveman et al., 2000).

2.2.2 Phase 2 – Understanding Health Inequities

After the ability to identify and describe health inequities was established there was a move to focus on understanding the underlying causes. (Berkman et al., 2014). More complicated theories included socio-political issues, for example: political context, type of health service provision and political, social and economic policies at national and global levels. Increasingly, the complex combination of these factors was acknowledged and the importance of context in determining their relative contribution was established (Marmot, 2008). Although, understanding the underlying causes of health disparity is important it is insufficient without the next step of solving health inequities (Edwards, 2012; Starfield, 2001).

2.2.3 Phase 3 – Solving Health Inequities

The next stage was to identify solutions to address health inequities. Potential solutions tend to be divided into three main themes depending on the underlying theory:

- increasing or improving the provision of health services to those in greatest need (Poltzeer et al., 2001, Yip & Berman, 2001);
- restructuring the way health is financed to decrease barriers for the disadvantaged (Gilson et al., 2000; Keskimaki, 1995); and

- addressing the broader socioeconomic determinants of health to influence the more distal causes of health inequities. (Macinko & Starfield, 2002)

The second two, broader population health solutions are found outside of clinical medicine, which has traditionally been grounded in an individual approach to health in which diagnosis and treatment focus on an individual's biology of disease. Clinical medicine was acknowledged as critically important, but represented only part of a needed and broader population approach (Koh et al., 2010). The third theme, addressing the socioeconomic determinants of health has been recognised as essential and as more cost-effective than individual clinical interventions when comparing the cost-effectiveness of population level interventions for disease prevention. (Chokshi & Farley, 2012).

Although the theoretical literature on solving health inequities is extensive, very little of it to date focuses on empirical interventions for improving outcomes for the most disadvantaged (Watt, 2002), and even less describes the successful integration of interventions into routine service delivery. Marmot has highlighted that most risk factors have a social gradient and these contextual factors are not always taken into account in clinical trials and population health studies (Marmot, 2009). Best practice clinical guidelines and protocols are largely based on randomised controlled trials (RCTs) using populations that have a single disease and are relatively more affluent and empowered. Results from these studies cannot be extrapolated directly to populations with less access to care, more multi-morbidity and socioeconomic disadvantage (Starfield, 2001). The field of population health intervention research has evolved to address these challenges.

2.2.4 Phase 4 – Population Health Intervention Research

Population health intervention research determines the effect of interventions, the processes by which they bring about change and the contexts within which they work best (Hawe & Potvin, 2009). This approach needs to go beyond “standard research paradigms” (Thomas et al., 2011, p.406) and includes: “public health critical praxis as a conceptual framework, addressing the determinants of health through comprehensive multi-level interventions, and ensuring explicit attention to self- reflection by researchers” (p. 407). This usually requires mixed methods research designs and realist methodologies to understand how interventions work, for whom and under what conditions including the impact of the context in which they are implemented (Edwards, 2012).

As affluent groups continue to benefit disproportionately from effective clinical interventions, the perverse effect of evidence-based medicine can be to increase inequalities in health. Population health research seeks to redress the absence of data quantifying the clinical effectiveness of interventions in deprived areas (Watt, 2002; Hawe & Potvin, 2009) with the ultimate goal of improving health outcomes in the most disadvantaged populations. This phase of population health research recognises that, to date, there have been many studies published showing interventions leading to improvements in health service delivery. However, the majority of these report trials with increased resources in ideal circumstances rather than demonstrating improvements in routine service delivery ie effectiveness trials rather than efficacy trials (Chambers et al., 2013).

When resource intensive trials (efficacy trials) are translated into routine service delivery (effectiveness trials) the results are often disappointing. The diminished

effects that occur as translation from clinical trials to clinical practice occurs have been described as “program drift” and “voltage drop”. These effects are being addressed through implementation science research using frameworks such as the dynamic sustainability framework (Chambers et al., 2013). This approach focuses on understanding the fit between intervention and context in translational research using an “adaption phase” that integrates and institutionalises interventions within local organisational and cultural contexts. Despite extensive evidence and many recommendations for changes to disease prevention and treatment they have remained largely confined to public health and academic medicine and require establishment in practice. Eliminating health disparities requires adapting, translating and disseminating proven interventions to reach and influence real world settings (Koh et al., 2010).

2.3 Study Epistemology

The epistemological perspective of population health intervention research has also evolved over time from a positivist paradigm to the emergence of a constructivist paradigm with the work of Guba and Lincoln (1989). Glasgow (2008) concluded that public health studies have focused largely on implementation efficacy research, that is, randomised controlled trials conducted in limited settings with strictly defined, homogeneous samples and resource-intensive, specialised intervention protocols, often with limited real-world application (Glasgow, 2008). The epistemology underlying this approach is positivist with the assumption that randomised controlled trials provide the gold standard (empiricist) evidence required.

Constructivism sees reality as a social construction and uses the interaction between stakeholders, including the researcher to create a constructed reality. This incorporates multiple perspectives from different stakeholders and including the

impact of context on the implementation and the evaluation (Guba & Lincoln, 1989). Further development of evaluation methodology led to theory driven evaluation and program logic model development in an attempt to understand who and why a program works. This approach requires an understanding of the theoretical assumptions, the links across the program activities and the expected outcomes (Bickman, 1987; Chen, 1990) and is strongly supported by the WHO (Kelly et al., 2007). The ability of this methodology to explain mechanisms and causal links has been challenged by Hawe et al., (2009). The importance of context, the mechanism(s) by which an intervention triggers an outcome and “what works for whom and under what circumstances was brought to prominence through the work of Pawson and Tilley (1997) in their book ‘Realistic Evaluation’. This methodology generates hypotheses from the literature and practitioner knowledge and has been critiqued for excluding the experiential knowledge of stakeholders (Gregory, 2000).

Tashakkori and Teddlie (2010) describe pragmatism as a foundational paradigm underlying mixed methods research. It is closely aligned with constructivism but with a stronger emphasis on common sense and practical thinking (Mertens). A pragmatic approach asserts both that there is a single ‘real world’ and that all individuals have their own unique interpretation of that world. Effectiveness is the criteria for defining the value of research rather than the discovery of truth. “Effectiveness is viewed as establishing that the results “work” with respect to the specific problem that the researcher seeks resolution of” (Mertens p. 37) This epistemology reflects the concept that research takes place in communities requiring the researcher to interact with the community both to understand the problem and to address it (Hall, 2013, Morgan, 2014). Researchers using this paradigm work closely with communities to determine solutions to problems and then judge the

appropriateness when implemented based on whether it achieves its purpose.

Researchers are not objective observers but an integral component and choose the methods that work best to answer the research question (Johnson, 2004).

Critical realism considers both the pathophysiology of illness and the systematic application of a theoretical model of how an intervention is supposed to work. This epistemology enables the collection of data on contextual factors, assumptions, and intermediate pathways, to provide evidence that the measured effects are likely to be due to the intervention, instead of limiting the researcher to comparison with a traditional control. Critical realism recognises that health system change is always dynamic and that understanding what influences particular experiences is essential to determine whether the promise of well-resourced pilot studies can be achieved more widely. Using a theoretical model assists with understanding processes and contexts. The replicability of experience across different contexts and the strategies supporting effective implementation are essential for understanding change and how it generates effects and is concerned with understanding how mechanisms actualise outcomes (Bhaskar, 2013).

My own perspective is that achieving health equity requires a critical realist approach to considering the social determinants of health, to implement population health interventions that translate research implementation efficacy into effectiveness in the community and real-world settings for broad-scale, sustainable change (Koh et al., 2010). Critical realism recognises that when we study the human world we are studying something fundamentally different from the physical world and so must adapt our research strategies to study it. More traditional positivist research approaches, for example RCTs, observe rather than explain cause and effect relationships. This highlights the need for frameworks and theories that articulate and

test relationships between elements of an intervention, their implementation and measureable outcomes. This thinking has led me to a shift away from purely descriptive and analytic population health research towards studies in which interventions are tested in real-world settings (Hawe & Shiell, 2007). This is important because challenges to adoption, implementation, and sustainability of interventions on a population level, particularly in resource-limited settings must be overcome to avoid exacerbating health disparities (Jilcott et al., 2007; Koh et al., 2010).

2.4 Study Methodology

The range of research questions in population health inevitably requires a range of research methodologies drawn from different disciplinary traditions (Fulop et al., 2001). Population health intervention research includes the use of methods to produce knowledge about policy and program interventions operating within or outside of the health sector that have the potential to impact health at the population level (CIHR, 2001; Hawe & Potvin, 2009). The complexity of the interconnected issues affecting program interventions requires study designs and methods that generate understanding of complex realities and processes. This requires an understanding of why and how interventions work, not just whether they are effective, and in what circumstances such interventions work well. (Kelly et al., 2007; Walt & Gilson, 1994). This necessitates evaluation of the processes as well as the effects, (Lavis et al., 2004) involving a range of research methods drawn from different disciplinary traditions (Mills, 2008). To this end, and in line with a critical realism epistemology, I have chosen to use case study and logic models as the methodologies for this thesis. A description of these methodologies and the rationale for their use in this thesis are outlined below.

2.4.1 Case Study

I chose case study research methodology to answer this research question because it allowed me to understand complex social phenomena and answer the questions why and how particular approaches were effective and identify the impact of context on outcomes (Yin, 2004). A case study is a research approach that is used to generate an in-depth, multifaceted understanding of a complex issue in its real-life context (Crowe et al., 2011). Case studies can describe the operational links traced over time, rather than just frequencies or incidences. Implementation science research questions (what works for whom in what circumstances), can be addressed by case study evaluations and answer the question “how can an intervention be adapted to a context in a way that is accessible and equitable?” (Donaldson et al., 2009). Case study involves the collection of both qualitative and quantitative data which are particularly appropriate for understanding and answering questions where the unit of the study is an intervention in context (George & Bennett, 2005). Case studies can be used to explain, describe or explore events to help understand and explain causal links and pathways resulting from an intervention (Yin, 2013).

The approach used in case studies depends on the epistemological viewpoint of the researcher, the research question and the underlying theory. A theory-based approach helps to generate knowledge that is potentially transferable to a range of clinical context and behaviours (Eccles, 2006). In this thesis papers authored by Reeve are used as case studies and represent a cohesive sample of population health interventions aimed at improving health outcomes in rural and remote Australia.

2.4.2 Logic Models

Logic models can include any of the following: conceptual frameworks, analytical frameworks, conceptual maps or influence diagrams. The use of logic

model analysis defines conceptually the links between inputs, outputs and the desired outcomes and includes the complex and interactive contextual relationships that are important in complex-adaptive real-life systems. Continuous quality improvement studies have shown that if we change structures we can change outputs. In this way, program logic models can be used to describe and explain the linkages important in organisational change, not just whether change has occurred. The program logic model uses change theory to describe and identify relationships, and enables the impact of service inputs to be associated with predetermined output indicators, providing an indication of progress towards long-term health improvements. (Gabriel, 2000).

Logic models assist the researcher to identify the key effect moderators or mediators enabling an intervention achieving its intended outcome. Measuring changes in health outcomes is challenging due to the complex interactions mentioned above. In addition, changes in health outcomes are influenced by external factors outside of health, particularly for disadvantaged and vulnerable populations, and improvements to health outcomes take time. To overcome and acknowledge these challenges I have used a logic model for the intervention analysis and evaluation. The evaluation logic model describes how the actions might produce the immediate outcome of interest (Yin, 2000) and is being increasingly used for case study evaluations (Mulroy, 2004) and in studying theories of change (Funnell & Rogers, 2011). Logic models can explain the plausible, logical links between program components and explain how the change came about (Chen, 2005; Mackenzie & Blamey, 2005).

2.5 Methods

2.5.1 Sampling

Stake (1995) has defined the three main types of case study – intrinsic, instrumental and collective. These categories are not mutually exclusive and may sometimes be combined. This thesis will use the collective case study, studying multiple cases sequentially to generate a broader appreciation of a particular issue in real life. In this thesis I will use case study methodology to analyse the health service programs that Reeve et al., have been involved in implementing and evaluating over the past 10 years. The unit of analysis (case) for this research are a purposive sample of the articles published by Reeve et al., that contribute to answering the research question. The cases have been organised into four groups according the type of intervention using the Health Impact Pyramid (Friedin, 2010):

- counselling and education
- clinical
- long-lasting protection and
- changing context

By coincidence, this is also the chronological order in which the interventions were implemented, reflecting Reeve’s real-life learning and the development of the population health literature over time and her role as a regional public health physician.

2.5.2 Logic Model Context Health Service Evaluation Framework (CHEF) Tool for Data Collection

The program logic model enables the impact of service inputs to be associated with predetermined output indicators, providing an indication of progress towards long-term health improvements. This thesis used the Context Health service

Evaluation Framework (CHEF) tool developed for the thesis to analyse each of the cases. The CHEF tool was built on a logic model that had been previously developed by Reeve et al., (2015c) for remote health service performance evaluation.

The Health Service Evaluation Framework

The initial logic model was originally developed by Reeve et al., through a targeted literature review of primary health service evaluation frameworks and delivery models to inform the development of the evaluation framework (Reeve 2015c). Mixed methods were used for the development of the framework. First, relevant literature around primary health care models in small remote and rural areas and community-controlled health services were reviewed including a targeted literature review of primary health service evaluation frameworks in Australia and overseas. This included both keyword searching using electronic databases and ‘snowballing’ based on the sentinel papers that emerged (including both peer-reviewed literature and ‘grey’ literature such as government reports and health service documents). Based on this review of the literature the research team developed and drafted a conceptual framework against which the change process and sustainability could be analysed. Second, local information was collected through in-depth interviews conducted with key stake-holders and focus groups. This framework was then workshopped with key stakeholders and leading rural and remote health researchers for validation.

There are no other comprehensive evaluation frameworks combining hospital services with primary health care services that we are aware of and this framework was developed to meet the need for an integrated framework that is fit for purpose using currently collected data linked to national indicators. It also highlights the

interrelated nature of primary health care, hospital services, the socioeconomic environment and their impact on each other using systems thinking.

Figure has been removed due to Copyright restrictions.

Figure 2.1 Health services evaluation framework for remote communities.

This original logic model was found to be contextually relevant to remote health services and was therefore adapted to develop the case study instrument and analysis tool known as the Context Health service Evaluation Framework (CHEF) tool. This tool was used in this thesis to consider the attributes of population health interventions to improve health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia. Each of the components considered in the case study analysis were defined carefully to ensure consistency of methods in the data analysis phase of the study. These definitions are outlined below based on seminal indicators of health service performance in the literature. Whether the intervention met these key criteria were assessed on a scale with three options - not met, partially met and fully met in the context of the program implementation. The narrative provided an assessment of the mechanism by which these attributes were achieved or not using the inside tacit knowledge of the researcher as a participant in the process combined with the more objective observations of the external supervisor.

Table 2.1 Definition of attributes used in the CHEF tool

Component	Definition
Accessible	Accessibility of the intervention to the target population including geographic, cultural, economic and socially disadvantaged or vulnerable people. Based on the WHO principle of universal health coverage as an essential strategy for improving health outcomes and health equity. The focus is on equitable access for the most disadvantaged populations.
Appropriate	Appropriateness of the intervention to the burden of disease and community needs. Acceptability of the intervention to the population, including culturally and socially. Appropriateness of the intervention as a population health approach based on the eight principles of The Population Health Approach.
Effective	Effectiveness of the intervention in achieving its goal.
Responsive	Responsiveness of the intervention to community input and experience of the intervention. Ability of the intervention to promote community empowerment.
Continuous	Continuity of the intervention across life stages. Continuity of the intervention across primary, secondary and tertiary prevention.
Efficient	Cost-effective use of resources to achieve desired results at a population level.

The CHEF tool was used retrospectively to perform the case study analysis in order to answer the thesis research question – “What attributes of the population health interventions described are effective in improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia”. The CHEF tool was used to make the underlying epistemology and assumptions explicit. In addition the theory of how the intervention was thought to work to in order to achieve its objectives in the context was described. Making the epistemology and theory explicit in the program logic model made it apparent what type of data would be required to answer the research question and perform the evaluation. The indicator categories were used to pragmatically assess whether the intervention “worked” to achieve its intentions or in other words was effective in achieving its

purpose. Data were analysed using the principles defined by Morse (1994):
comprehension, synthesis, theorising and re-contextualisation.

Table 2.2 Context Health service Evaluation Framework (CHEF) Data Collection Instrument

Context and Participants					
Intervention and Objectives					
Program Theory					
Implementation			Outcomes		
Indicators	Inputs	Outputs	Short-term impact	Medium-term impact	Long-term goal
Accessible					
Appropriate					
Effective					
Responsive					
Continuous					
Efficient					
Evidence – data sources					

**Assumptions
Epistemology**

External Factors

2.5.3 Case Study Protocol

Data from each of the cases was collected by the researcher from the information contained in each publication and using the researcher’s knowledge of and reflection on the intervention and evaluation using the standard data collection format below.

- Introduce the journal articles that act as the case studies.
- Describe the context and participants involved in the intervention.

- Define the intervention being implemented, including the objectives including the assumptions made in designing the implementation.
- Identify inputs and outputs and use the CHEF tool to describe the attributes of the population health intervention and resulting evaluation: Accessibility, Appropriateness, Effectiveness, Responsiveness, Continuity and Efficiency.
- Identify the short- and medium- term outputs and intended outcomes and use the CHEF tool to describe the strengths and limitations of these in the real-life context.
- Cite evidence using the initial logic model in explaining how and why the intervention did or did not lead to the improvements taking into account any significant external factors.
- Present the lessons learnt by considering the strengths and weaknesses with reference to the CHEF tool template in Table 2.2.

2.5.4 Role of the Researcher

The researcher has several roles in this research thesis as discussed in detail the previous chapter:

1. In conducting the original research that led to the publications that are the subjects of the case studies that make up the thesis. At the time of the case studies Reeve was part of each of the groups involved in the population health interventions and therefore I come to this study as an informed insider for each case. When I am describing my historical role or insights in these interventions I use the third person voice in this thesis. This will enable me to separate my previous experience and learnings from the new knowledge that this thesis develops.

2. In developing the evaluation tool and protocol/evaluation method that is being used for the case studies to evaluate each case using the CHEF tool in a consistent manner. In this role I will use a first person voice to demonstrate that I have an active part in interpreting the research outcomes.

2.6 Rigour of Qualitative Methodology

Recent literature on improving case study rigour in health-systems research emphasises the need to select cases carefully so that they are appropriate and offer valuable insights by gathering rich information on the contextual features relevant to each case (Walt et al., 2008). In addition, the adoption of an explanatory rather than a descriptive focus is recommended (Walt et al., 2008). The approaches used in this thesis are consistent with this advice. Qualitative research is valued for its differences to quantitative research and cannot be judged by same criteria. (Cutcliffe & McKenna, 1999; Carter & Porter, 2000). The rigour of qualitative research includes the comparable criteria of credibility, dependability, confirmability and transferability (Lincoln & Guba, 1985).

Case studies are useful for the study of phenomenon in its natural context which was one of the objectives of this study (Schofield, 2000). Case study methodology was chosen to enable an understanding of the complex issues involved and to explore how and why interventions were effective. Case studies can be used to explore and explain causal links resulting from an intervention. Measuring the impact of interventions on health outcomes can be difficult because of the long time lag before changes in health outcomes to become apparent. In addition, there are many external factors that influence health particularly for vulnerable or disadvantaged populations. To address these challenges a logic model was developed as a data collection and analysis tool.

2.6.1 Construct Validity or Confirmability

Key validated health service performance indicators were used to ensure construct validity. Construct validity is defined as the extent to which the data represent the situation being studied. To fulfil construct validity requirements the health service evaluation criteria are based on seminal articles in the literature identifying the key principles leading to the identification of validated sentinel indicators. These key indicators of accessibility, appropriateness, effectiveness, responsiveness, continuity and efficiency are widely used in health service evaluation (AIHW, 2004; Canadian Institute for Health Information, 2006; NHPA, 2012). The key dependencies of sustainability, quality of care and social determinants of health have also been identified from key works in the literature (Wakerman & Humphreys, 2011; NHPF, 2009). They have been added to reflect the importance of their impact and interdependence when achieving the performance indicators. For example, essential sustainability requirements (workforce, infrastructure funding linkages and governance) need to be effectively in place in order to achieve structural performance. In the same way, poor quality of care will undermine process indicators and the socioeconomic determinants of health will impact health outcomes.

The key principles of primary health service evaluation were adopted from two seminal pieces of work - Donabedian's (1988) quality of care paradigm linking structure, process and outcomes using program evaluation theory and Starfield's (2005) identification of key features of quality primary health care to reduce disparities in health outcomes in vulnerable populations. The requirements underpinning performance assessment in primary health care developed by Sibthorpe (2004) using the Australian National Health Performance Framework (NHPA, 2012)

provided indicators appropriate for the Australian context. This approach combines the two key principles of health performance improvement; external accountability and internal quality improvement (Freeman, 2002). Given the paucity of literature on comprehensive primary health service evaluation in remote communities, the PHC service evaluation framework (the ‘Elmore framework’) developed by Tham et al., (2010) provided a basis for modification to a remote context. Tham, Humphreys, Kinsman, Buykx, Asaid et al., (2010) used work from the Canadian Institute for Health Information (2006) and the National Health Performance Committee in Australia to identify validated sentinel indicators for health service performance, sustainability and quality of care in rural areas.

2.6.2 Internal Validity or Credibility

The internal validity or credibility of a piece of qualitative research is related to the extent to which the research design allows conclusions to be drawn. In this thesis, the complex role of the researcher as both subject and informed insider increases the risk of interpretation bias and poor internal validity. This risk has been managed through consistent data collection process using the standardised logic model tool for analysis of the cases. On the positive side, Lincoln & Guba (1985) describe prolonged engagement or persistent observation as important strategies for credibility. This requires an intimate relationship with the case study sites to gain a full understanding of the situation. The close involvement of the researcher in all of the cases was able to assist in this manner.

2.6.3 External Validity or Transferability

The external validity or transferability of qualitative research can be described as a measure of how far the conclusions of this study can be transferred beyond the study context. Recent literature recommends multiple cases and cross-case

comparisons using relevant theory to guide inquiry (Walt et al., 2008). As the case studies use different programs in different locations, the context of each case will be described to ensure the findings are generalisable to other similar settings – rural and remote Aboriginal primary health care service provision. The use of mixed methods or triangulated research using complementary methods to address different facets of a research issue is increasingly recommended as a means of establishing external validity (Bowling, 2014). Descriptions of the context in the case papers enables readers to make an informed decision about the applicability to their context. Multiple case studies in different contexts allows comparisons across the series and provides a more ‘convincing and accurate’ case study (Casey & Houghton, 2010). The use of multiple cases with different interventions and in differences contexts provides some external validity.

The key primary health care evaluation principles are applicable to other contexts and the indicators can be modified based on the demographics and health needs of the population using local tacit knowledge and expertise to ensure flexibility and adaption to the context. The modification of the Elmore framework to a remote health service provides a framework for evaluating health service performance, particularly in the many remote areas where there are small district hospitals and primary health care services as the sole providers. This enables comprehensive information to be fed back to health providers and the community as part of regular planning cycles. Many health services are based on historical service provision focused on acute episodic care. An integrated evaluation framework enables health services to make informed decisions to modify service provision in response to community needs in order to improve health outcomes for their communities.

2.6.4 Reliability or Dependability

Clearly documented steps and procedures have been used to maximise reliability. In particular a clear case study protocol and the use of specified published articles as data provide a case study database. The analysis framework has been determined prior to data collection and applied to each case in order to provide an audit trail for replication. The use of the same data collection instrument and logic model for each case analysis was to improve reliability and dependability.

The service performance indicators were divided into structural and process domains and a service performance outcome table was added to evaluate health outcomes, based on the National Health Performance Framework and indicators from Australia's Health (Australian Institute of Health and Welfare, 2010) to enable external benchmarking and consistency with other evaluation frameworks. The sustainability indicators or essential service requirements remained largely unchanged from the Elmore framework, with some minor contextual modifications. Quality indicators were selected due to the largely Aboriginal population to align with the Northern Territory Key Performance Indicators (NTKPI) (Northern Territory Department of Health, 2009), the National Framework for Aboriginal and Torres Strait Islander life cycle (Department of Health and Aging, 2006) and National Indigenous Primary Health Care Key Performance Indicators (IPHCKPI) (Australian Institute of Health and Welfare, 2014b).

2.7 Ethics

I did not seek ethics approval for this case study thesis as no new data were collected. However, each of the papers presented as case studies had ethics approval (as outlined in the journal articles). When working with all participants, and particularly when working with Aboriginal and Torres Strait Islanders, Reeve et al.,

followed ethical principles outlined in the NHMRC Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research. These principles were developed in response to increasing criticism of how research was being conducted, and with a view to providing a greater understanding of Aboriginal and Torres Strait Islander values (Humphrey, 2001). Six values that lie at the heart of these guidelines are: reciprocity, respect, equality, survival and protection, responsibility and finally, spirit and integrity. These principles are considered individually in respect to the cases included in this thesis and how they were followed and applied.

2.7.1 Reciprocity

In the research context, reciprocity implies inclusion and means recognising partners' contributions, and ensuring that research outcomes include equitable benefits of value to Aboriginal and Torres Strait Islander communities or individuals. The aims of the cases presented in this thesis were to identify approaches to health service delivery that would be of greater benefit to Aboriginal and Torres Strait Islander people and improve their wellbeing in alignment with the National Strategic Framework for Aboriginal and Torres Strait Islander Health 2003–2013 (Department of Health, 2007). A large majority of the participants in the interventions reported in this study were Aboriginal and Torres Strait Islander people. The individual projects were made possible by using the links between local project teams and their Aboriginal communities. The intervention teams anticipated that the Aboriginal and Torres Strait Island population as a whole would benefit from the introduction of population health interventions developed in partnership with Aboriginal and Torres Strait Islander people and adapted to the local primary health care context.

2.7.2 Respect

Respectful research relationships acknowledge and affirm the right of people to

have different values, norms and aspirations. Kowal et al., (2005) describe four rationales for seeking Indigenous participation in research – pragmatic (a means to a successful project), moral (a means to alter power relationships), interventionist (a means improving outcomes for those involved), and epistemological (a means to access Aboriginal knowledge to frame questions differently, and understand things differently), although there is obviously some overlap. My critique of the guidelines identified respect as the biggest issue causing tension between the project teams and the organisational fund holders. In the cases in this thesis the view held by the government fund holders was largely pragmatic, with Aboriginal and Torres Strait Islander participation seen as a requirement for ‘ticking the box’ rather than essential to success. As fund holders they were driven by annual reporting of previous externally decided indicators and outcomes without input from Aboriginal and Torres Strait Islander people as to what their priorities and potential solutions to improving health outcomes would be. This is a common issue and illustrates the difference between tokenistic and true community engagement. The project team and stakeholders held a more epistemological view based on the belief that the knowledge possessed by Aboriginal and Torres Strait Islander people is essential and meaningful participation is required to access that knowledge.

2.7.3 Equality

One of the values expressed by Aboriginal and Torres Strait Islander people and cultures is the equal value of people. The underlying goal of the interventions outlined in this thesis is providing the resources necessary to achieve health outcomes equitable with those in mainstream Australia by addressing the increased burden of chronic disease faced by Aboriginal and Torres Strait Islander people.

2.7.4 Responsibility

Central to Aboriginal and Torres Strait Islander societies and cultures is the recognition of core responsibilities. These responsibilities include those to country, kinship bonds, caring for others and the maintenance of harmony and balance within and between the physical and spiritual realms. Transparency regarding the purpose, methodology, conduct, and outcomes of the projects were maintained with Aboriginal stakeholders and partners.

2.7.5 Survival and Protection

A particular feature of Aboriginal and Torres Strait Islander cultures has been the importance of a collective identity. Taking this value into account was assisted by expressed desire from communities for resources and health services that take the distinctiveness of Aboriginal culture into account. One of the ways that the distinctiveness of the many different components to Aboriginal and Torres Strait Islander cultures were taken into account was to minimise the prescriptive nature of the interventions to encourage them to be used in a less prescriptive manner as a framework or guideline and be adapted and made appropriate for the context.

2.7.6 Spirit and Integrity

This is an overarching value that binds all others into a coherent whole. The diversity of Aboriginal and Torres Strait Islander people was acknowledged and attempts made to be inclusive. The long timelines and formal contractual arrangements of the Fitzroy Valley Partnership enabled the involvement of the communities in decision-making and demonstrated a commitment to working within the spirit and integrity of Aboriginal and Torres Strait Islander people.

2.8 Summary

This chapter describes the case study methodology used to answer the research

question: “What attributes of population health interventions are effective in improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia” in this thesis. Firstly, in this chapter I describe the evolution of foundation theories in population health research, situate these in contemporary theoretical perspectives (from detecting to understanding to solving health inequities), and consider the key ethical issues of working in the field of Aboriginal and Torres Strait Islander health. Contemporary population health research theory recognises the need to consider the context of population health interventions and ask what works for whom in which context. This focus aligns well with critical realism.

Secondly, in this chapter I describe a range of epistemologies used in population health and describe my stance as critical realism. Critical realism combines the philosophies of science and social science, considering both the pathophysiology of illness and the systematic application of a theoretical model of how the intervention is thought to work. This epistemology enables the collection of data on contextual factors, assumptions, and intermediate pathways. A theoretical model assists with understanding processes and contexts.

The rationale for the use of case study methodology is described. It enables an understanding of the complex issues involved and to explore how and why interventions were effective. Case studies can be used to explore and explain causal links resulting from an intervention.

Although there are a number of logic models available in the literature, the specific context of rural and remote Aboriginal health required a context relevant tool. Reeve has previously collaborated with a research group to develop a health services evaluation tool specifically for this context. I further modified this to develop the CHEF data collection and analysis tool. A purposive sample of articles

by Reeve published over the past 10 years were chosen as the cases for analysis. The cases are organised into four groups according to the type of intervention using the health impact pyramid developed by Frieden et al.

Program logic models can be used to describe and explain the linkages important in organisational change not just whether change has occurred. The program logic model uses change theory to describe and identify relationships, and enables the impact of service inputs to be associated with predetermined output indicators, providing an indication of progress towards long-term health improvements. The author chose to adapt a remote health services evaluation tool developed previously by Reeve et al., as it was fit for context (remote health services). The CHEF tool presented in this chapter is the data collection and analysis tool used to evaluate each of the case studies outlined in the following chapters.

Finally, in this chapter I consider the methodological rigor and address concerns regarding confirmability, credibility and dependability of this study. In the next chapter the first case study which describes the theoretical implementation of a single clinical intervention is analysed using the CHEF tool. Careful description of use of the CHEF tool will demonstrate further the methodological rigor of case study analysis.

Chapter 3: A Single Clinical Intervention to Improve Health Outcomes

3.1 Introduction

This chapter provides a comprehensive description of the CHEF data collection tool to demonstrate how I managed the complex role of informed insider. Then this chapter and the next four chapters consider seven case studies using the CHEF analysis tool outlined in the methods chapter. These cases have been organised into four groups according the type of intervention using the Health Impact Pyramid by Friedin (2010) described in the methodology and each of the groups form a chapter as outlined in Table 3.1. This chapter describes a potential single clinical intervention. Following this, Chapter 4 considers the effective attributes of long-lasting protective interventions. In Chapters 5 and 6 the effectiveness of changing the context of health care delivery, initially around the model of care for a single disease; and in the final chapter the effect of reorientation of the health service as a whole is discussed.

Table 3.1 Case Studies in the Thesis

Chapter number heading/category	Case title	Case description	Publications
3 Single clinical intervention	Case 1	RSV Prophylaxis	Reeve 2006a, Reeve 2006b
4 Long-lasting protective intervention strategies	Case 2	School-based HPV vaccination	Reeve 2008a
	Case 3	Expanding the role of paramedics	Reeve 2008b
	Case 4	Indigenous lifescrpts	Reeve 2008c
5 Changing context – models of care	Case 5	Ear health pathway	Reeve 2014
	Case 6	Management of type 2 diabetes – a community partnership approach	Harch 2012
6 Changing context – Health service reorientation.	Case 7	Community Participation in health service reform	Reeve 2015a
		Strengthening Primary Health care	Reeve 2015b

These four chapters use the CHEF tool to consider the effectiveness of population health interventions to improve health outcomes of Aboriginal and Torres Strait Islander people living in rural and remote Australia. Then attributes of each case which could be relevant to the success in context are highlighted to be drawn together in Chapter 7.

This chapter describes the context and the intervention used in the case study by Reeve et al., (2006a and 2006b). The data are collected using the case study CHEF instrument using the definitions in the population health analysis tool to reveal what was effective about the intervention. Then attributes of the case study which may be relevant to success are highlighted and reconsidered in subsequent chapters.

3.2 Case Study 1 – Cost-Effectiveness of Respiratory Syncytial Virus Prophylaxis with Palivizumab for High Risk Patients: A Theoretical Model of a Clinical Intervention

3.2.1 Context

The Townsville Hospital is a public tertiary care hospital serving patients from the North Queensland region, extending as far as Mount Isa and Cape York with an estimated resident catchment population of 717,105 people in 2010, of whom 7% identify as of Aboriginal or Strait Islander descent. The Townsville Hospital currently has over 580 beds, and the next main referral hospital is the Royal Brisbane and Women's Hospital in Brisbane some 1,375 kilometres away. The Townsville Hospital is a major tertiary maternity centre, with 2,308 babies delivered in 2010, of whom 20% were of Aboriginal and Torres Strait Islander descent. Prior to 2006, clinicians in the Townsville Hospital identified that a large number of babies were

admitted with respiratory syncytial virus (RSV) and a disproportionate number seemed to be of Aboriginal and Torres Strait Islander descent.

Palivizumab is an RSV monoclonal antibody that may provide passive immunity and has been endorsed by the American Pediatric Association for use in high-risk infants (1998). As infection rates vary throughout the world, there was a need for the development of local guidelines (Hall et al., 1999) and it was decided to embark on a study. The aims were first, to identify and quantify risk factors for RSV hospitalisation in Townsville, and second, to determine if treating these groups prophylactically with Palivizumab would be a cost-effective intervention. The study aimed to identify groups at particular risk of hospitalisation with RSV-positive lower respiratory tract infection, as suggested by Henckel et al., (2004), in preparation for a broader study on the cost-effectiveness of Palivizumab. This began as a two week independent audit for my Master of Public Health and developed into a two year research project.

The scientific assumption behind this intervention was that prophylaxis with Palivizumab would decrease hospitalisations with RSV infection. The second assumption was that Aboriginal and Torres Strait Islander babies were at highest risk of infection and may be an appropriate high-risk target group for intervention. The intervention assumption was that identifying individuals at high risk and providing prophylaxis at the time that they were at highest risk would be a cost-effective intervention at a population level.

3.2.2 Intervention

Case Study 1 illustrates an early step in an implementation science approach: modelling of an intervention prior to implementation. This involves taking empirical evidence of effectiveness from the literature and performing pragmatic modelling to

determine if the proposed intervention is likely to be effective in achieving the expected outcomes in the local implementation context.

In Case Study 1 the literature review suggested that Palivizumab prophylaxis could be an effective intervention for high-risk infants using empiricist evaluation to determine “can this intervention work in ideal circumstances?” This employs the theory of scientific plausibility and positivist epistemology as appropriate for the question. The case study then used an exploratory model to answer the next question “will the intervention be effective in this context under usual conditions and achieve the desired outcomes?” In other words, are the findings in the literature generalisable to the current context. To answer this question a pragmatic model using the plausible relationships was developed.

Input – Potential provision of Palivizumab to high risk neonatal groups

There is no specific vaccine against RSV and, therefore, the role of immunoprophylaxis with the monoclonal antibody Palivizumab was evaluated as an intervention to reduce hospitalisation with RSV infection in the Townsville Hospital. An American randomised, double-blind controlled trial (IMpact trial, 1998) demonstrated that monthly administration during the RSV season resulted in an 80% reduction in hospital admissions for RSV infection among babies without chronic lung disease or chronic heart disease. As a result, the American Academy of Pediatrics (1998) recommends that Palivizumab should be considered in certain high-risk groups, particularly babies born prematurely. Cases of RSV-positive bronchiolitis admitted to the Townsville Hospital over the previous 7½ years were retrospectively identified and matched 1:2 with control babies also born in the Townsville Hospital over the same time period, but not admitted to hospital with RSV bronchiolitis. Risk factors for RSV infection were identified from the literature

as potential predictors of RSV infection and considered as covariates in the analysis. Stepwise multivariate logistic regression analysis and classification and regression tree analysis were used to identify significant predictors of RSV infection. Only those with a statistically significant impact and confounding variables were included in the final model (Reeve et al., 2006a).

Output – Risk factors identification and stratification

Multiple logistic regression analysis identified low birthweight of the baby (<2000 g: $P < 0.001$), maternal multiparity ($P = 0.005$) and single mother ($P = 0.010$) as independent predictors of RSV infection in Townsville. The classification and regression tree analysis confirmed that babies born weighing <2500 g to single mothers who smoked had an increased risk of hospitalisation with RSV. Being of Aboriginal and/or Torres Strait Islander descent was not an independent risk factor in the study, consistent with Koopman's (2002) conclusion that adjustment for socioeconomic factors eliminated the difference in RSV prevalence between ethnic groups (Koopman et al., 2002). The study confirmed that Aboriginal and Torres Strait Islander mothers are more likely to have babies of lower birthweight, to be younger, multiparous, unemployed, to smoke, be single and be in the lowest quartile of the socioeconomic index.

Outcomes –The prevention of hospitalisations with RSV

The high rate of hospitalisation in Aboriginal and Torres Strait Islander infants is similar to that observed in Indigenous people of other developed countries (Singleton et al., 1995) and comparable to the rates in developing countries (Noyola et al., 2004; Selwyn, 1990; Weber et al., 1998). Being of Aboriginal and Torres Strait Islander descent was not identified as a risk factor in our study, but was associated with a higher exposure to socioeconomic risk factors. Numbers needed to treat were

calculated and costs for the intervention estimated using theoretical modelling. The dose of Palivizumab for each baby was calculated and this cost was then compared to actual costs of hospitalisation with RSV in the Townsville Hospital (Reeve et al., 2006b). Palivuzumab is very expensive and even in the groups identified to be at highest risk a program of immunoprophylaxis would not be a cost-effective intervention to reduced hospitalisations due to RSV in the Townsville Hospital.

3.2.3 Journal Articles/Data

The papers in Appendix 1a and b of this thesis describe this clinical intervention to improve health outcomes of Aboriginal and Torres Strait Islander people and form the “data” for the analysis of the case study.

3.2.4 Results

Table 3.2 CHEF Findings for Case Study 1: Modelling RSV Prophylaxis with Palivizumab

Context and Participants					
Newborn babies in Townsville at high risk of respiratory syncytial virus infection					
Intervention and Objectives					
To determine the economic feasibility of RSV prophylaxis with Palivizumab in babies at the highest risk of developing RSV					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	Palivizumab for high risk infants in Townsville Hospital context	Identify high risk babies with a view to prescribing Palivizumab	Number needed to treat to prevent one hospitalisation: Low birth weight - 89 Indigenous low birthweight – 24 Low birthweight and siblings - 33 Gestation <33 weeks – 42 Ex-NICU 78	May decrease hospitalisation rates from Total births 22/1000 Indigenous babies 33/1000 Non-Indigenous babies 20/1000	Would not decrease hospitalisations due to RSV in a cost-effective manner No effects on mortality No effects on risk factors
	Partially met Partially met Partially met	Met Met Not met			
Responsive Continuous Efficient	Not assessed Not met Not met	Not assessed Not met Not met			
Evidence - Data sources	Palivizumab manufacturer costs Published literature on effectiveness	Hospital medical records and data analysis Published literature on risk factors	Hospital medical records	Hospital medical records and laboratory data	Hospital medical records, Hospital clinical and financial information

Assumptions

Palivizumab prophylaxis for high risk babies reduces hospitalisation with RSV infection
Aboriginal or Torres Strait Islander race is a significant risk factor

External Factors

Social determinants of health (smoking, single parent, birthweight, parity) determine risk of RSV infection.

3.2.5 Analysis

This case study began with the assumption that a biomedical intervention with Palivizumab for high-risk individuals would be an effective way to achieve the outcome of decreased RSV hospitalisations in the Townsville Hospital. The second assumption was that being of Aboriginal and/or Torres Strait Islander descent would be the greatest risk factor for hospitalisation with RSV in the Townsville Hospital.

Input

Using the CHEF tool (Table 3.2) I judged the accessibility of input to be partially met as Palivizumab would be provided by health service free of charge to those at high risk. However, with a moderately mobile population in the region and the difficulty of finding high risk babies and bringing them back to the hospital for the administration of Palivuzmab, I judged it likely that a number of high risk infants born in Townsville but living in the region would not actually receive immunoprophylaxis if the program was implemented.

I judged the appropriateness of giving palivizumab to high risk infants to be only partially met because prophylaxis with an antibody is not a long term solution like immunisation it would cover the highest risk period for infection and is the only alternative clinical intervention in the absence of an immunisation for RSV. In addition, the intervention is likely to only be acceptable to some of the population.

I judged the effectiveness of the administration of palivizumab to high risk infants to be not met because it would not be effective in achieving the goal of reducing hospitalisations because even in high risk infants the efficacy of Palivizumab in prevention hospitalisation is only 80% at best.

Responsiveness to the community was not formally assessed at this modelling

stage. In addition, from a population health approach, this ‘one-off’ individually targeted clinical intervention was neither continuous across life stages or across primary, secondary and tertiary prevention, nor an efficient use of resources to achieve the desired results at a population level.

Each of the judgements regarding inputs were audited and discussed with my primary supervisor to triangulate the use of the CHEF tool. Where there were discrepancies in our judgements for Case 1, these were discussed until consensus was reached

Output

Using the CHEF tool (Table 3.2) I judged the accessibility of the output (identifying high risk infants) to be met for the target population as a whole because the risk stratification could be done at the time of delivery in hospital at no cost to the individual. Stratifying risk factors in the community was an accessible intervention using hospital records data. I judged the appropriateness of identifying and treating of high risk infants to be met because the intervention was based on evidence of the burden of disease from the literature, and contextualised to the Townsville population. I judged the effectiveness of identifying babies at high risk to not be met due to the high proportion of babies admitted to The Townsville Hospital with RSV infection and no identifiable risk factors. Stratification by risk factors was not found to be an effective intervention in the context of this case study because, although clear risk factors were identified and a cumulative effect associated with increased risk of RSV, the majority of the babies who required hospitalisation with RSV did not have any identifiable risk factors and therefore would be missed.. Again, each of these judgements were audited and discussed with my primary supervisor to triangulate the use of the CHEF tool. Where there were discrepancies

in our judgements for Case 1, these were discussed until consensus was reached.

Outcomes

I judged the effectiveness of the provision of regular RSV prophylaxis to be unmet due to high numbers that would need to be treated in order to avoid a single hospitalisation. The recall of the at-risk cohort of infants for prophylaxis with Palivizumab was considered appropriate as a preventive approach however, the reality of getting the infants identified at high risk to come back to the hospital for the palivizumab infusion would require time and effort for the parents of children involved and likely to exclude the most disadvantaged.

The CHEF tool demonstrated that the intervention as a whole would not be effective if introduced, due to the high numbers needed to treat to reduce hospitalisation rates. It was unlikely to achieve the outcomes of the intervention due to the absence of a high risk group that would be cost effective to treat. The logic model highlighted the underlying assumptions or theory behind the intervention and the external factors impacting the achievement of the outcomes.

Overall, the intervention was judged not to be efficient as a population health approach as it would not decrease hospitalisations due to RSV in a cost-effective manner when the cost of the prophylaxis were compared to the actual hospitalisation costs (Table 3.2). In addition, due to the high numbers needed to treat to reduce hospitalisation rates – and in spite of the plausible scientific linkage between inputs, outputs and outcomes – Palivizumab would not achieve the long term goal of reducing hospitalisations in a cost-effective manner. With the CHEF tools’ description of the success of this case outlined, I turned my attention to understanding of the attributes of the case which may have influenced success using the eight principles of the Canadian population health template.

3.2.6 Lessons Learnt from the Case Study

This Case Study used a single targeted clinical intervention for improving health outcomes of Aboriginal and Torres Strait Islander people. The effectiveness of using Palivizumab prophylaxis as a population health approach to reduce hospitalisations with RSV infection was evaluated using the CHEF tool and found to be not effective. However, modelling the intervention prior to implementation to determine if would be effective in the Townsville context was a very effective population health approach. I then considered the case study through the conceptual lens of the Canadian population health template to identify potential aspects of the intervention which may be common to other cases in bringing about improvements in health outcomes. I asked whether there was any evidence that that the following eight attributes played a part in the success of the intervention: focus on health of populations; address the determinants of health and their interactions; base decisions on evidence; uses multiple strategies; employs mechanisms of community involvement; collaborates intersectorially; increases upstream investment; and demonstrate accountability for health outcomes. My initial themes are outlined below.

Epistemology, theory and evaluation

In Case 1 it was evident that the intervention team had sought to be accountable for health outcomes by seeking to measure the degree of potential change attributable to the proposed introduction of Palivizumab prophylaxis. I noted an alignment of epistemology, theory and evaluation measures. Coming from a positivist epistemology, previous researchers used a causal-scientific theory (that immune-prophylaxis reduces hospitalisation with RSV infections) to design an Empiricist evaluation to answer the question “Does Palivizumab work in ideal

conditions?” Translating this research into the practical context of improving health outcomes for Aboriginal and Torres Strait people in rural and remote areas required a pragmatic epistemology (where the predominant theory was that immune-prophylaxis could be useful for management of high risk infants in Townsville) to test the effectiveness in context and answer the question “Does this intervention work under usual conditions in Townsville?” Pragmatic theoretical modelling was a useful population approach in this case study using a theoretical model to test the assumptions in context and determine the cost-effectiveness of Palivizumab before introducing it, and demonstrating accountability for the opportunity cost of using Palivizumab in the context of a health service with a fixed budget.

Testing assumptions

The Canadian population health model highlights the importance of basing decisions on evidence. This pragmatic exploratory modelling of an intervention highlighted the importance of implementation science – trialling the translation and adaption of an intervention from the literature to the context to maximise outcomes prior to program implementation. The multiple logistic regression analysis and the classification and regression tree analysis determined that identifying as Aboriginal or Torres Strait Islander was not an independent risk factor for RSV hospitalisation, but instead was a marker of socioeconomic disadvantage and therefore increased exposure to multiple socioeconomic risk factors.

Determinants of health not addressed with a single clinical intervention

This case study enabled the researchers to test their assumptions regarding a clinical biomedical intervention to target high risk individuals and highlighted that the main risk factors were socioeconomic. A single clinical intervention was therefore not the answer to improving health outcomes for this disease in this

population that is significantly disadvantaged socioeconomically. This case illustrates the potential importance of using multiple approaches and in particular the principles of population level risk intervention and high risk individual interventions (Rose, 2001).

The high rate of hospitalisation in Aboriginal and Torres Strait Islander infants was similar to the high rates observed in Indigenous people of other developed countries (Singleton et al., 1995) and comparable to the rates in developing countries (Noyola et al., 2004; Selwyn, 1990; Weber et al., 1998). This highlights the high impact of socioeconomic disadvantage and marginalisation. Unless the efficacy of a single intervention is very high (for example, measles vaccination) and the effect long-term (newborn screening for inborn errors of metabolism) an effective population approach will require multiple strategies and multiple interventions in a continuous approach over the whole risk period to be effective.

3.3 Summary

First, in this chapter, the CHEF tool, designed by the author in collaboration with other researchers, and then modified by me for the purposes of this thesis demonstrates a systematic analysis of the intervention in the rural and remote Australian context. Case Study 1 describes theoretical modelling of targeted prophylaxis with Palivizumab that is shown to be insufficient to achieve the long term goal of reducing RSV related hospitalisations in this context. This intervention used a pragmatic hypothetical modelling approach to consider whether RSV related hospitalisations could be reduced through targeted prophylaxis with Palivizumab. Due to the high cost of the Palvizumub and the large numbers needed to treat, this intervention would not be a cost-effective intervention in even the highest risk groups.

The thematic analysis of the case study enabled me to propose aspects of a population health approach to health service delivery for Aboriginal and Torres Strait Islander people that are effective in bringing about improvements in their health outcomes. In this case study three preliminary themes regarding the success of population interventions emerged: aligning epistemology, intervention and evaluation; testing assumptions; and the weakness of a single strategy in addressing the determinants of health. These potential themes need further testing through analysis of other cases in the series to determine consistent attributes of effective population health interventions that are successful in improving health outcomes for Aboriginal and Torres Strait Islander people in rural and remote Australia. The next chapter describes three case studies with long-lasting protective interventions to improve the health outcomes of rural and remote Aboriginal and Torres Strait Islander people.

Chapter 4: Long-lasting Protective Interventions to Improve Health Outcomes

4.1 Introduction

In the previous chapter a case study of a single clinical intervention was considered. Three initial themes regarding attributes of an effective population health approach to improve health outcomes for Aboriginal and Torres Strait Islander people in remote Australia emerged from the first case. These need further testing and refinement. In this chapter, the implementation and evaluation of a series of innovative public health strategies to provide long-lasting protective interventions, rather than single clinical interventions, to improve health outcomes at a population level are investigated. The first is an evaluation of using existing primary health services to roll out a new immunisation program. The second is an evaluation of population health training for paramedics to expand their role to include health promotion and chronic disease management as a strategy to increase workforce capacity in areas with a high burden of disease and workforce shortage. The final evaluation is of the development of an evidence-based health promotion tool as a strategy for the reduction of lifestyle risk factors among Aboriginal and Torres Strait Islander people with the goal of reducing some of the inequity in health outcomes.

The cases in this chapter describe the implementation of three public health programs in rural and remote northern Australia. The data for each case study were collected and analysed using the same CHEF instrument as in the previous chapter and then thematic analysis was carried out to further modify my conceptual framework.

4.2 Case Study 2 – An Evaluation of a New Human Papilloma Virus Vaccination Program

4.2.1 Context

Mount Isa is the administrative, commercial and industrial centre for the north-western region of Queensland. It has a population of 21,992 recorded at the 2011 census and 33,200 in the surrounding district, 19% of whom identify as of Aboriginal and/or Torres Strait Islander descent. This area has the highest rates of avoidable deaths and the lowest life expectancy in Australia (NHPA, 2013). The incidence of cervical cancer in Aboriginal and Torres Strait Islander women is more than twice that of non-Indigenous women, and mortality five times the non-Indigenous rate. Participation in cervical screening cannot currently be measured nationally by Aboriginal and Torres Strait Islander status with cervical cytology register data, but there is evidence that this group is under-screened (AIHW, 2011b). Cervical screening rates for eligible women in the Mt Isa local geographical area was only 49.9% compared to the rest of Queensland at 57.9% (Queensland Health, 2009), this is likely to be even lower for Aboriginal and Torres Strait Islander women. This highlights the potential impact and importance of cervical cancer prevention in this context.

4.2.2 Intervention

The scientific assumption behind this intervention was that human papilloma virus (HPV) vaccination of schoolgirls would decrease cervical dysplasia and cervical cancer rates. The implementation assumption was that integrating school immunisation provision with general practice would provide an effective model for the introduction of the new vaccine.

Clinical trials suggested that HPV vaccination was an effective approach to

reduce the mortality and morbidity due to HPV infection (Garland et al., 2007; Siddiqui & Perry, 2006; Villa et al., 2005) and the decision was made by the Australian Government to add the additional vaccine to the national school immunisation schedule. A general practice in Mt Isa was awarded a tender to provide the school-based immunisation program for the town for two years. The schedule included the current immunisation program and the introduction of the new HPV vaccination. Previously, the school immunisation program had been contracted to the shire but they no longer had the capacity to introduce the new vaccination. The intervention for this case study was the introduction of the three doses of HPV vaccination for female Year 10, 11 and 12 students, in addition to the usual school schedule using general practice as the provider.

Input – Immunisation

The vaccination schedule was for female year 10, 11 and 12 students to receive three doses of HPV vaccination as part of the broader immunisation program which included vaccination for hepatitis B, varicella-zoster and diphtheria-tetanus-pertussis for all students in years 8 and 10.

Output – Immunisation uptake

Data were collected on the number of consent forms returned, how many declined vaccination, how many students were vaccinated and those requiring catch-up vaccines, as well as the total number completing the full course of immunisations.

Outcomes – Immunisation coverage

Immunisation coverage for HPV achieved was 89% for the first dose, 88% for the second dose and 79% for the third dose. This was higher than other comparable school vaccination programs. These rates were also higher than predicted by surveys

in the literature prior to the introduction of the vaccination (Marshall et al., 2007: Hausdorf et al., 2007). Based on trial data in the literature, vaccination will have a significant impact on reducing cervical dysplasia, genital warts and cervical cancer in those vaccinated (Garland et al., 2007). It will have no effect on cervical cancer due to the HPV serotypes not contained in the vaccine or for those who were infected prior to vaccination.

4.2.3 Journal Articles/Data

The paper in Appendix 2a of this thesis describes this long-lasting intervention as a pragmatic approach to improving health outcomes for Aboriginal and Torres Strait Islander people and forms the “data” for the analysis of the case study.

4.2.4 Results

Refer to Table 4.1.

Table 4.1 CHEF Findings for Case Study 2: An Evaluation of a New Human Papilloma Virus Vaccination Program

Context and Participants High school students in Mt Isa					
Intervention and Objectives To determine the effectiveness of providing school vaccinations (new HPV in particular) through a local general practice					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	HPV immunisation Fully met	Immunisation consent Fully met	Immunisation coverage First dose 89%	Decrease in genital warts and cervical dysplasia	Long-term effects on mortality expected to be high based on coverage rates. No effects on risk factors
Responsive Continuous Efficient	Fully met	Fully met	Second dose 88%		
	Fully met	Fully met	Third dose 79%		
Evidence - Data sources	Partially met Partially met Partially met	Not evaluated Not applicable Not evaluated			
	Published literature on effectiveness	Consent form return. Comparison with other schools and immunisations from health department records	Immunisation records	Cervical cancer register for dysplasia	Cervical Cancer Register

Assumptions
HPV immunisation of school girls will decrease cervical dysplasia and cancer rates

External Factors
Social determinants of health (smoking, number of sexual partners, immunocompetence) and HPV infection determine risk for cervical cancer.

4.2.5 Analysis

Input

Vaccination against HPV infection in this context using general practice was accessible as it was provided free through the school. There was also the opportunity to catch up missed vaccinations at the general practice. The long-term protective effect of the vaccine was considered appropriate for the burden of disease and an effective intervention based on scientific evidence available in the literature. As a population health approach this long-lasting protective intervention was potentially continuous across the life span due to the long-term protection anticipated by vaccination. The very high primary protection provided should remove the need for secondary and tertiary prevention for the HPV types included in the vaccination.

Output

Gaining consent through the school system provided high accessibility of the intervention to the target population. Achieving consent for immunisation using the school system to distribute and collect consent forms was appropriate and consistent with previous vaccination programs. There was also the opportunity to come into the practice as an alternative for those who preferred this option. Implementation was effective in this context as evidenced in the high consent rate. Responsiveness to the community was not formally assessed, although it could be argued that the high consent rate demonstrated community acceptance at a minimum. Using the school process seemed an efficient use of resources to achieve the desired results. The very high protection rates of the vaccine and the high burden and cost of cervical dysplasia in the population result in an efficient use of resources to achieve the desired results at a population level.

Outcomes

Overall, the CHEF tool demonstrated that using a general practice to gain consent and provide HPV vaccination as part of the school vaccine schedule was effective in the context of this case study, achieving high vaccination rates and potentially a large decrease in genital warts and cervical dysplasia and, in the long term, a decrease in mortality due to cervical cancer (Table 4.1) in this relatively high risk community. The analysis of the intervention in the case study enabled us to identify aspects of a population health approach to health service delivery for Aboriginal and Torres Strait Islander people that were most effective in bringing about improvements in their health outcomes.

4.2.6 Lessons Learnt from the Case Study

Epistemology, theory and evaluation

In Case 2 I again noted an alignment of epistemology, theory and evaluation measures.

This pragmatic exploratory trial of a long-lasting preventive intervention to improve health outcomes highlights the importance of the next step in an implementation science approach – trialling the adaption of implementation methodology to the context to maximise outcomes. This involved using empirical evidence of effectiveness of an intervention from the literature and adapting the implementation method to the context to determine if the method was effective in achieving the expected outcomes. The case study was an exploratory study to answer the question – “Will the implementation of this intervention through general practice be effective in this context and achieve the desired outcomes?”

Due to the pragmatic evaluation approach, the opportunity to more fully explore the methodology as a mechanism was missed. A realist evaluation could

have looked at contextual risk factors and perhaps determined what worked about the intervention and for which group it was more effective and why. This may have identified areas for further research about other additional strategies or interventions. This may have further increased the effectiveness and gained a better understanding of the context and mechanism as well as their relationships to the outcomes and may have made the findings more easily translatable to other locations. Due to the quantitative approach we were unable to answer questions such as: why the vaccination rate decreased with subsequent doses, and why some children were not vaccinated at all. This would help answer the questions about what worked for whom and why.

This case study measured the outputs and the short-term impact of increased immunisation rates, not the medium- and long- term goal of reducing genital warts, cervical dysplasia and cervical cancer morbidity and mortality that are anticipated in the longer term. Due to the linkage between inputs, outputs and outcomes using the logic model analysis tool it was demonstrated that providing school-based HPV vaccination through general practice achieved the outputs and short-term impact, providing an indication of progress towards achieving the long-term goals.

Translating research evidence into health service delivery

Interventions need to be adapted to the context and evaluated to ensure they are effective when translated to the implementation context. Although research trials had shown the efficacy and effectiveness of HPV vaccination in the trial context, Australia was the first country to implement HPV vaccination into the routine school vaccination schedule. This case study was one of the first studies trialling the implementation of HPV vaccination in the “real world”. This case study took available research evidence of the effectiveness of the HPV vaccination and

combined it with local expertise in delivering immunisations to translate it into a successful program using a population health approach. The findings added to the limited body of research in this area, enabling the lessons learnt to be applied to new contexts when the HPV vaccination was implemented in other areas and countries around the world.

This case study enabled the researchers to test their assumptions around the effectiveness of implementing the intervention through a partnership between the school and a local general practice to achieve high coverage rates for the HPV vaccination and, in the long term, reduce the morbidity and mortality due to HPV in this population. This intervention was effective as a population health approach as the implementation phase achieved the short-term outcomes it was designed to achieve. It is also likely to be highly effective in achieving the longer term outcomes due to the high efficacy of the HPV vaccine as a long-lasting protective intervention. This anticipated lifelong effect of the vaccine has yet to be realised but is expected to provide continuity over the life span.

Addressing the social determinants of health using multiple-level strategies

An effective population approach requires multiple strategies, particularly in disadvantaged populations, to counter the adverse effects of the social disadvantage. This case study took place in one of the areas with the poorest health outcomes in Australia and has a relatively large proportion of Aboriginal and Torres Strait Islander people at 19%. Although not specifically targeting Aboriginal and Torres Strait Islander people, a large proportion of the students in this remote location identified as Aboriginal or Torres Strait Islander or were socioeconomically disadvantaged. In fact, one of the high schools was a private school and one a state school and we were able to achieve high coverage in both. The children from the

state school were more often opportunistically vaccinated through the general practice when they presented for other health issues. This was an effective way of increasing immunisation rates for the Aboriginal and Torres Strait Islander students in particular. Using a proactive systematic population approach that identified and actively targeted students who missed out on the vaccination at school contributed to high vaccination rates in this vulnerable high-risk population; it has the potential to improve health equity by ensuring high-risk and vulnerable groups are not missed.

The logic model evaluation also highlighted potential opportunities for improving the intervention by addressing other risk factors for cervical cancer. The addition of multiple strategies to reduce other risk factors and address the underlying factors responsible for the socioeconomic determinants of health would achieve greater improvements in health outcomes for cervical cancer. Although the efficacy of this single intervention is very high (90–100%), it is only effective if provided prior to HPV infection; additionally, protection is only provided against subtypes in the vaccine. Therefore, additional strategies to address other risk factors for cervical cancer could have made the intervention more effective. These could include, for example, health education around the risk factors for cervical cancer – including multiple partners and unprotected sex – that would also add value to other sexual health programs to prevent sexually transmitted diseases, infertility and unplanned pregnancies, particularly in the teenage group. In addition, most women currently at risk of cervical cancer and dysplasia are not in the high-school age group and are already likely to have been exposed to HPV. This requires the addition of other strategies to address this issue – for example, increased screening for cervical cancer.

Integration

This intervention was an effective approach for achieving its goal of improving

health outcomes and demonstrates the importance of considering the context of the intervention and the potential opportunities for integrating with other primary health care programs and other local providers. Integrating the school vaccination program with a general practice and with the other school-based immunisations resulted in good uptake of the vaccination. Many of the children who missed the vaccination at the school were able to be caught up through the general practice surgery, resulting in coverage rates that were better than other areas using more traditional models for the provision of school vaccinations. Collaboration across the education sector and the health sector (both private practice and public health departments) were an important part of the success of this approach.

A systematic approach

It was thought that the possible reasons for the success of this implementation model were the expertise and systematic approach of the practice that involved recalling patients for vaccination. The practice also had tried and successful systems in place for providing the preschool vaccination program, including an excellent knowledge of the importance of the cold chain, especially in hot climates. Parents/guardians were also offered the opportunity to bring their children to the practice to receive vaccine doses that were missed at the school due to illness or absence. A few parents preferred to have their child immunised at the practice rather than at the school. This proactive systematic approach to contacting parents or guardians when vaccines were missed and providing follow-up opportunities was not a usual part of the previous school-based program. There was also the chance to provide the missed vaccinations opportunistically when students presented to the practice for other reasons. This was particularly effective for children with high school absenteeism and who are often at increased risk.

In addition, providing continuity with the preschool immunisation program in an environment of trusted providers with whom the community was familiar and in a convenient location may also have contributed to the excellent coverage for this new vaccine. The adult female HPV vaccine catch-up program was also provided through the practice and the integration and consolidation of these programs may have contributed an additional benefit.

4.3 Case Study 3 – Expanding the Role of Paramedics in Northern Queensland: An Evaluation of Population Health Training

4.3.1 Context

In the late 1990s, the Australian Government established 11 University Departments of Rural Health (UDRH) as a rural health workforce program to improve health outcomes in rural and remote areas by providing education and research targeted to local health needs (Ranmuthugala et al., 2007). There are hundreds of remote Aboriginal communities and relatively few doctors in northern Australia. Many of them have clinics staffed by remote area nurses and Aboriginal Health Workers and visited on a regular basis by medical staff and allied health. These remote area nurses have an extended scope of practice compared to registered nurses working in facilities staffed by doctors. This extended scope of practice is supported by legislation that enables nurses who have undergone approved advanced training courses to be able to administer medications according to endorsed guidelines with the telephone support of medical practitioners. The UDRH in Mt Isa, the Mt Isa Centre for Rural and Remote Health, developed the Graduate Certificate in Rural and Remote Paramedic Practice for advanced practice paramedics, modelled on remote area nursing training. The aim of the graduate certificate was to expand the scope of practice for paramedics to include preventive health care and chronic

disease management in partnership with other health professionals in rural and remote areas.

4.3.2 Intervention

The assumption behind this intervention was that providing a graduate course in population health would increase participants' knowledge and scope of practice and, in the long term, improve health outcomes for the population. The research question answered in the case study was whether the course increased the paramedics' knowledge and changed their practice and intention to work in rural and remote areas. This intervention built on empirical evidence of the effectiveness of population health training from the literature (Macinko et al., 2003; O'Meara et al., 2012; Stirling et al., 2007) and local experience in remote area nursing. The intervention sought to adapt this evidence to the context of paramedic training. In this case study the literature suggested that expanding the scope of practice of rural and remote health practitioners may be an effective strategy to address workforce shortages and increase capacity to manage the increasing burden of chronic disease. The case study was an intervention study to answer the question "will the implementation of population health training for remote paramedics achieve the desired outcomes of engaging them in population health activities?"

Input – graduate certificate

The graduate certificate is a one-year program culminating with the conferring of the qualification of Isolated Practice Area Paramedic. The first six months were based on the Rural and Isolated Practice Endorsed Registered Nurse course covering acute and chronic disease presentation. The second component focused on health promotion, interdisciplinary chronic disease management, infectious diseases and Aboriginal and Torres Strait Islander health issues.

Output – students graduating from the course

Thirty paramedics working in rural and remote Queensland were enrolled in the graduate certificate. Data were collected on the number of students who completed the course and surveys were administered to capture changes in knowledge, attitude and behaviour. Analysis of paramedics' reported opinions about the course and its impact was performed using the de-identified surveys submitted by the paramedics at the beginning and the end of the population health component of the course.

Outcomes – increased scope of practice

Of the paramedics who completed course, 87–90% agreed that the course increased their knowledge, 75% that it increased their likelihood of staying in rural and remote areas, and 100% agreed that the course and the changes they had made to their practice increased their job satisfaction. Some 73% said they had already changed their practice because of the course, 20% had concrete plans to change and 7% were considering making changes.

4.3.3 Journal Articles/Data

The paper by Reeve, Pashen, Mumme, De La Rue, and Cheffins (2008) entitled “Expanding the role of paramedics in northern Queensland: An evaluation of population health training” was published in the *Australian Journal of Rural Health* 16(6), pages 370 to 375 can be found in Appendix 2b at the end of this thesis. This article describes this pragmatic intervention as a population health strategy to improving health outcomes for Aboriginal and Torres Strait Islander people and forms the “data” for the analysis of the case study.

4.3.4 Results

See Table 4.2.

Table 4.2 CHEF Findings for Case Study 3: Expanding the Role of Paramedics in Northern Queensland: An Evaluation of Population Health Training

Context and Participants					
Paramedics in north Queensland doing population health training to increase their scope of practice to provide preventive care and assist other health professionals to manage chronic disease in rural and remote areas					
Intervention and Objectives					
To determine the effectiveness of population health training for paramedics in changing their practice and the likelihood of remaining in rural and remote areas as a strategy for increasing the primary health care workforce using an interdisciplinary team.					
Indicators			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	Population health training Fully met Fully met Fully met	Number completing the course Fully met Fully met Fully met	Increased knowledge 87–90% Likelihood of staying rural and remote 75% Increase job satisfaction 100%	Change in practice 73% already changed, 20% have concrete plans to change and 7% were considering making changes	Long-term effects on mortality, morbidity and risk factors expected but not assessed.
Responsive Continuous Efficient	Fully met Partially met Not evaluated	Fully met Partially met Not evaluated			
Evidence - Data sources	University course data	University course data	Pre and post course surveys	Post course surveys	AIHW data collections



Assumptions
Completing the course will increase paramedics' knowledge, skills and scope of practice.



External Factors
Long-term health outcomes are influenced by other factors such as access to health care and the social determinants of health.

4.3.5 Analysis

Input

The course was made accessible for the participants by using an online format. Although the input in this case was limited to 30 students who met the criteria for entry into this pilot study, the intent was for replication and dissemination across rural and remote areas of Australia. The focus on a preventive approach to managing the growing burden of chronic disease in the course makes it an appropriate population health intervention for this high-risk population. The feedback from participants was that it was an effective program, responsive to their perceived needs for professional development and desire for an increased scope of practice. The focus on primary, secondary and tertiary prevention and integration with other health care providers meets the criteria of continuous in the longer term. The implementation of the population health course was judged to be appropriate, accessible, effective and responsive in this context, as evidenced in the high completion rate.

Output

There were high levels of satisfaction with the course and purported outcomes after one year. The flexibility of the course to allow students to defer or receive extensions in acknowledgment of the challenges of studying while working in rural and remote areas and responsiveness to local needs was essential for effectiveness. Responsiveness to the community was not formally assessed as part of the evaluation. Responsiveness of the course to the needs of the participants was assessed. This course was designed to be continuous in the longer term through its investment in health professionals to extend their practice to provide care across the life span of patients using a proactive, preventive approach as long-lasting preventive

intervention. While the efficiency of the intervention was not formally evaluated, it was designed to be an efficient intervention, building the capacity of health professionals who were already part of the health workforce in areas of high burden of disease and health need. One aspect of this approach was the use of the current workforce with a very narrow scope of practice resulting in underutilisation of their time and skills in rural and remote areas, precisely where the burden of preventable disease is very high and workforce shortage evident. The effectiveness of the intervention as a whole was assessed on the effectiveness of the implementation and achievement of the desired outputs. This was achieved based on the principles of investing in strengthening primary health care and is expected to maximise current resources as efficiently as possible to achieve the desired results.

The CHEF tool demonstrated that using population health training for advanced practice paramedics to increase the capacity of remote primary health care was effective in achieving the short- and medium- term impacts and the potential to decrease the mortality and morbidity of the population in the long term (Table 4.2).

4.3.6 Lessons Learnt From the Case Study

Epistemology, theory and evaluation

This case study was a pragmatic exploratory trial of the adaption of the remote area nursing model to the paramedic context to determine if it would be effective in achieving the expected outcomes. The case study was an exploratory study to answer the question – “will the implementation of this intervention be effective in this context and achieve the desired outcomes?” The generation of an evidence base around the intervention was a useful aspect of a population approach in this case study, recognising the importance of adapting an intervention to the context to maximise effectiveness prior to wider implementation. The quantitative approach

used in the surveys limited the qualitative data available, but the student quotes and open-ended questions described some aspects of why the program worked. A more qualitative approach could have looked at contextual factors and perhaps determined what aspects of the program worked and how it could have been improved. It would also have been valuable to capture feedback from the community and have the opportunity to respond and adapt the program further.

This case study measured the outputs and the short- and medium- term impact of the course that are anticipated to achieve the long-term goal of reducing disease risk factors, morbidity and mortality in the longer term, based on the logic model. The program logic model enabled the impact of providing population health training to be associated with the changes in knowledge, attitude and behaviour, providing an indication of progress towards long-term health improvements.

Translating research evidence into health service delivery

Although experience has shown the efficacy and effectiveness of the remote area nursing model in remote Australia (Birks et al., 2010, Coyle et al., 2010), this study was one of the first to trial expanding the scope of paramedics to include primary health care. This case study took available research evidence of the effectiveness of population health training for rural and remote health professionals. It then combined it with their expertise in delivering health education and training in the local context to translate it into a successful program, adding to the limited body of research in this area. This enabled lessons learnt to be applied to new contexts.

This case study enabled the researchers to test their assumptions around the effectiveness of population health training for remote paramedics as a long-lasting preventive intervention to increase the primary health care capacity in remote areas and, in the long term, reduce the morbidity and mortality of this population. This

intervention was considered effective as a population health approach as the implementation phase achieved the short-term outcomes it was designed to achieve. It is also likely to be highly effective in achieving the longer term outcomes due to the experiential learning of the staff and their changes in attitude and behaviour during the course. This case used a long-lasting preventive intervention with the potential for population level improvements in health outcomes for Aboriginal and Torres Strait Islander people by investing in increasing the capacity of the primary health care workforce.

Integration

This intervention demonstrates the potential opportunities for integrating with other primary health care programs and providers locally. A strategy used in this case was the training of current staff while they maintained their employment and simultaneously implemented their newly acquired skills. This ensured they had a good knowledge of the context and local community and the learning provided was able to be applied experientially, the surveys indicated these factors were important to achieving the short- and medium- term outcomes. Using a postgraduate course developed specifically for the purpose of increasing the population health skills, knowledge, and scope of practice for paramedics is expected to result in a workforce that can work more closely together thereby increasing the synergy and capacity of the limited health workforce in rural and remote areas. Providing education about a population health approach to patient care using the same curriculum as used for remote area nurses working in the same communities was thought to contribute to more effective paramedic practice and improve health outcomes in the long-term by strengthening the capacity of the interdisciplinary primary health care team. In the evaluation, most of the paramedics described becoming more involved with the other

health care providers and communities in their areas and that their role had changed from “providing transport to the hospital” to becoming involved in the patients’ long-term care, including providing follow-up.

Although this program was successful in the short-term, lack of funding or sustainable integration into the health service resulted in the program coming to an end after the trial period. This highlights the challenge of making interventions sustainable in the long-term after the funding of the pilot is finished.

Addressing the social determinants of health using multiple-level strategies

Although not exclusively targeting Aboriginal and Torres Strait Islander people, a large proportion of the population in remote locations identify as Aboriginal or Torres Strait Islander people and improving their health outcomes was the key aim of this intervention. An effective population approach requires multiple strategies to overcome the socioeconomic disadvantages of living in remote areas. Population health training equips health professionals to advocate for changes in their community to make healthy choices easier and to work with their communities towards this aim using the principles of the Ottawa Charter. Many of the course graduates described becoming more involved in their communities and becoming involved with health promotion.

4.4 Case Study 4 – Indigenous Lifescritps: A Tool for Modifying Lifestyle Risk Factors for Chronic Disease

4.4.1 Context

As part of the Australian National Chronic Disease Strategy the “Lifescritps” brief intervention tools were launched by the Commonwealth Government in 2005. Brief interventions are an evidence-based approach to reducing lifestyle risk factors. The Commonwealth developed “Lifescritps” as a tool for health professionals to

assist with this process. Effective health promotion requires appropriate tools and the standard Lifescripts resources were modified for use with Aboriginal and Torres Strait Islander people by the Mt Isa Centre for Rural and Remote Health. The aim of the modification was to develop a more flexible and appropriate resource for health professionals to use to achieve behavioural change and reduced lifestyle risk factors for chronic disease in the Aboriginal and Torres Strait Islander population nationally.

4.4.2 Intervention

The overall assumption behind this intervention was that providing culturally appropriate brief interventions about healthy lifestyles would reduce the prevalence of behavioural risk factors for chronic disease in the population, and ultimately, the mortality and morbidity of the population. The secondary assumption tested in this case study was that involving health professionals working in Aboriginal and Torres Strait Islander health, and with Aboriginal and Torres Strait Islander community members in consultation and testing in the development of the new resources, would result in brief intervention tools that would be more appropriate for use in this context.

Evidence in the literature suggested that opportunistically using brief interventions in primary care is an effective strategy to address behavioural risk factors for chronic disease. The original Lifescripts, however, were developed for mainstream practice and it was thought that adapting them for use with Aboriginal and Torres Strait Islander people would make them more effective in this context.

The case study was an exploratory study to answer the question “will the involvement of stakeholders in the development of the modified Lifescripts result in an appropriate and effective tool for health professionals to use for brief lifestyle interventions with Aboriginal and Torres Strait Islander people?”

Input – Original Lifescripts

The Australian Government Department of Health and Ageing supported the development of two evidence-based intervention tools as part of its National Chronic Disease Strategy. These were the ‘SNAP’ framework – for interventions around smoking, nutrition, alcohol and physical activity; and the Lifescript resources, based on the Australian guidelines for disease prevention in primary care. These resources were designed to integrate chronic disease risk factor management into general practice and provide general practice staff with the resources and skills to advise patients on how to reduce lifestyle factors for chronic disease.

Output – modification of Lifescripts

To obtain feedback and input from Aboriginal Health Workers, other health professionals working in Aboriginal and Torres Strait Islander health services and local Aboriginal and Torres Strait Islander community members for the adaption of the Lifescripts resources.

Outcomes – modified Lifescripts

The original Lifescripts resources were modified after extensive consultation and testing, particularly with Aboriginal Medical Services and their patients. These revised resources incorporated the validated stages of change model and were adapted to be more flexible and culturally appropriate.

4.4.3 Journal Articles/Data

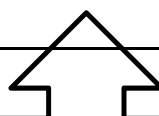
The paper in Appendix 2c describes this strategy as a population health approach to improving health outcomes for Aboriginal and Torres Strait Islander people and forms the “data” for the analysis of the case study.

4.4.4 Results

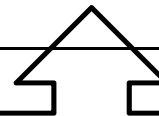
Refer to Table 4.3.

Table 4.3 CHEF Findings for Case Study 4: Indigenous Lifescripts: A Tool for Modifying Lifestyle Risk Factors for Chronic Disease

Context and Participants Health professionals working with Aboriginal and Torres Strait Islander people in Australia.					
Intervention and Objectives Development of the Indigenous Lifescripts as a brief intervention tool for modifying lifestyle risk factors for chronic disease					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	Original Lifescripts resources	Consultation developing Lifescripts resources	To develop brief lifestyle intervention tools appropriate for use with Aboriginal and Torres Strait Islander people.	Increase knowledge and skills of primary health care to provide brief lifestyle intervention for Aboriginal and Torres Strait Islander people.	Long-term decreases in chronic disease mortality, morbidity and risk factors expected but not assessed.
	Fully met Partially met Partially met	Fully met Fully met Partially met			
Responsive Continuous Efficient	Not met Partially met Partially met	Partially met Partially met Partially met			
Evidence - Data sources	Original Lifescripts	Project report	Indigenous Lifescripts	Not evaluated	AIHW data collections



Assumptions
Stakeholder input makes resources more appropriate. Providing culturally appropriate brief interventions around healthy lifestyle reduces chronic disease.



External Factors
Social determinants of health influence risk factors (smoking, alcohol, diet, exercise, income, education) for chronic disease.

4.4.5 Analysis

Input

The original Lifescripts resources were widely accessible for general practice in Australia and evidence for the general appropriateness and effectiveness of the brief intervention tools was available. However, no evidence existed for their appropriateness and effectiveness with Aboriginal and Torres Strait Islander people. The continuity, responsiveness and efficiency of the original Lifescripts resource were not evaluated in this study, but feedback sought in discussions around modification suggested that they were not widely used in Aboriginal Medical Services visited as part of the study due to the inappropriate format and content.

Output

The modified Indigenous Lifescripts were appropriate, accessible and responsive, based on the feedback from health providers and community members. Providing input into development of the new resources was made accessible for the participants by inviting Aboriginal Medical Services to be involved and visiting sites that agreed. It was, however, limited to a representative sample by the time constraints and resources available. The focus on a preventive approach to managing the growing burden of chronic disease make it an appropriate population health intervention for this high-risk population. The feedback from participants in the consultation and testing of the new resources was that they were more effective and user-friendly. The responsiveness to their perceived needs by providing more appropriate resources was appreciated. The focus on primary and secondary prevention and the potential to use them across the lifespan by most health professionals met the criteria of a continuous approach across the lifespan. Involving

key stakeholders in the adaptation of the health promotion tools to be more appropriate for their context was an effective population health implementation strategy to achieve a more appropriate resource for reducing lifestyle risk factors. It is likely that involvement in the process will increase ownership and engagement with the new resources among the participating Aboriginal Medical Services and make the achievement of the longer term goals more likely. The use and impact of the resources in the long term were unable to be measured as part of this case study. The Commonwealth published them as kits and distributed them to all Aboriginal Medical Services across Australia and offered them to any other primary health care services that requested them. Using the logic model evaluation we were able to demonstrate that the outputs and short-term impact were achieved and predict that, based on published literature, (Mark et al., 2004, Mikhailovich et al., 2007; McLennan et al., 2004) it is likely that the longer term goals will be achieved.

It was also noted that to improve health outcomes in the long term a more holistic approach to addressing the underlying social determinants of health would be required. While the efficiency of the intervention was not formally evaluated, integrating brief interventions into general practice and primary health services is considered to be an efficient intervention for strengthening primary health care, particularly in areas of high burden of disease and health need. (Bailie et al., 2007a; Brady et al., 2002; RACGP, 2009)

The CHEF tool demonstrated that involving key stakeholders when modifying the Lifescrpts resources to make them more culturally appropriate for Aboriginal and Torres Strait Islander people was effective as a long-lasting protective intervention in this case study. It enabled the achievement of the short-term impacts and potentially the medium-term impact and decreasing the mortality and morbidity

of the population in the long term (Table 4.3).

This case study used the involvement of local stakeholders in the modification of health promotion resources to better meet the needs of Aboriginal and Torres Strait Islander people as a long-lasting protective intervention with the potential to achieve improvements in their health outcomes. The analysis of the intervention strategy in the case study enabled us to identify aspects of a population health approach to health service delivery for Aboriginal and Torres Strait Islander people that were most effective in bringing about improvements in their health outcomes.

4.4.6 Lessons Learnt from the Case Study

Epistemology, theory and evaluation

This pragmatic exploratory trial of a strategy to improve health outcomes highlights the importance of modifying national programs and resources to the local context. This intervention used empirical evidence of the effectiveness of brief interventions from the literature and adapted it to the context of Aboriginal and Torres Strait Islander health to improve effectiveness in achieving the expected outcome. Although there were focus groups and surveys to gather information about how the resources could be adapted and their potential effectiveness, the approach used was not a realist evaluation, which may have provided us with additional information. For example, many of the Aboriginal Health Workers commented that just receiving the resource packs in the mail was insufficient and they would like training on how to use them and integrate them into practice.

This case study measured the outputs and the short-term impact and predicts that the achievement of the medium-term impact and long-term goal of reducing chronic disease risk factors, morbidity and mortality are anticipated in the longer term, based on the logic model.

Translating research evidence into health service delivery

Although experience has shown the efficacy and effectiveness of using brief interventions on an individual basis, the evidence suggests that modifying the environment at a community level to make healthy choices easier would have greater impact in the long term. (Baum, 2003; Freil et al., 2007; Marmot et al., 2008). The intervention used available research evidence of the effectiveness of brief interventions and combined them with the local experience and knowledge of health professionals and community members to develop a more effective tool.

This case study enabled the researchers to test their secondary assumption that stakeholder input from health professionals and community members would increase the effectiveness of health promotion resources as a long-lasting preventive intervention. (Marmot, 2000; McLennan et al., 2004). We were unable to test the second assumption that providing more appropriate resources would reduce individual risk factors for chronic disease and in the long-term reduce the morbidity and mortality of this population. The evidence in the literature used to develop the logic model suggests that this a likely longer term outcome (Gardner et al., 2011 Mark et al., 2004, Mikhailovich et al., 2007). This intervention was considered effective as a population health approach as the implementation phase achieved the short-term outcomes it was designed to achieve. It is also likely to be effective in achieving the longer term outcomes due to the evidence around the potential for increased health literacy and brief interventions to change attitude and behaviour.

Integration

This intervention demonstrates the potential increase in impact by integrating brief interventions and health promotion with other primary health care programs and providers locally. This approach has the potential to provide coverage of the

whole population at risk and has the additional benefit of integration with chronic disease programs already being provided by primary health care services. This enables a systems approach to health promotion, screening and management across the lifespan. After extensive use of the resources across Australia, the change of government in 2013 led to the Department of Health withdrawing the Lifescrpts resources and it is still considering the future availability of the resource. This lack of long-term integration and support from the Department resulted in a lack of long term sustainability and effectiveness of this resource with great potential and highlights the vulnerability of funding and supporting short term projects to the political environment.

Addressing the social determinants of health using multiple-level strategies

Although not specifically targeting rural and remote Aboriginal and Torres Strait Islander people a large proportion of the population in rural and remote locations identify themselves as such and the resources were tested in rural and remote areas as well as major centres to ensure their appropriateness. Providing tools specifically designed for people that may not have English as a first language was considered by participants to be particularly useful in remote areas.

The Ottawa Charter suggests that using multiple strategies is an important aspect for successful health promotion and this is particularly true for populations who are socioeconomically disadvantaged and suffering the greatest impact of the adverse effects of the socioeconomic determinants of health. Although the individual behavioural interventions have impact, reorientating health services to focus on prevention and addressing the underlying causes would be even more effective. For example, strengthening community action to create supportive environments through subsidising fruit and vegetables in community stores to change the context and make

healthy choices easier, and changes to public policy to provide free gym memberships or safe environments for exercising are more likely to have greater impact at a population level.

Community participation

Modifying a brief intervention tool for use with Aboriginal and Torres Strait Islander people was an appropriate and effective approach based on feedback from health professionals and Aboriginal and Torres Strait Islander community members. The opportunity to get feedback and involve stakeholders, particularly community members and Aboriginal Health Workers, was another advantage of the approach of this case study to improve the effectiveness of the strategy in the long term.

4.5 Chapter Summary

This chapter considered three case studies involving a long-lasting protective intervention based on the public health impact pyramid for classification. Case Study 2 describes the implementation and evaluation of a school vaccination program against HPV that was led from a general practice setting in a remote Australian community with a high proportion of Aboriginal and Torres Strait Islander people. This population health intervention was effective in achieving high coverage rates likely to achieve the goal of reducing HPV-related morbidity and mortality in the long-term using a pragmatic exploratory trial approach. This case study highlighted the importance of adapting the intervention methods to context in remote Australia when seeking to improve the health outcomes for Aboriginal and Torres Strait Islander people.

In Case Study 3, by using the logic model linkages between inputs, outputs and outcomes it was determined that the postgraduate certificate was an effective way of increasing the knowledge, skills and scope of practice of rural and remote

paramedics to include health promotion and the management of chronic disease. It could be an effective population health approach to improving health outcomes in the long term. This case study demonstrated the value of translating research evidence (effectiveness of remote area nurses) to other contexts using innovative new strategies (developing a remote paramedic model). Importantly, this case is an example of seeking to strengthen primary health care through investing in the skills of health professionals in remote areas to increase their capacity to address local health needs and integrating primary health care resources as part of an interdisciplinary team. Assumptions of the potential impact of teaching paramedics preventive care and chronic disease management skills were tested through participant feedback. This case study achieved the implementation outputs and the short-term impact and predict the achievement of the long-term population goal of reducing morbidity and mortality due to high the burden of disease by using the logic model. This intervention illustrated the potential of providing a long-lasting preventive intervention through increasing the local primary health care capacity to achieve the long- term goal of reducing morbidity and mortality.

Case Study 4 illustrated the potential effectiveness of more culturally appropriate tools for health promotion and chronic disease management as part of a long-lasting protective population health approach to reducing lifestyle risk factors for chronic disease. The key intervention, involving local stakeholders in the process, was very effective in achieving the short-term outcomes of the project. Using the analysis tool this was an appropriate intervention due to the focus on prevention, developing resources appropriate to the context. The aspects of the intervention that were found to be most effective were the potential for integration into pre-existing health promotion and chronic disease programs provided by primary health care

services. The logic model analysis determined that involving local stakeholders and communities in the modification of the Lifescripts resources was an effective way of increasing the appropriateness and effectiveness of the brief intervention tool and has the potential to increase the knowledge, skills and ability of health professionals working with Aboriginal and Torres Strait Islander people particularly in rural and remote areas. This case study measured the outputs and the short-term impact, and predicted achievement of the long-term population goal of reducing morbidity and mortality and increasing health equity using the evidence behind the logic model evaluation. This case study was unable to look at the effectiveness of implementing the modified tool into primary health care practice and evaluate whether the tool was effective in reducing lifestyle risk factors. Instead it highlighted the importance of integrating it into a comprehensive systematic chronic disease program, and the importance of community participation and local involvement to make it effective and sustainable in the long term. All of these interventions were dependent on ongoing funding for sustainability and illustrated the vulnerability of interventions to the political climate.

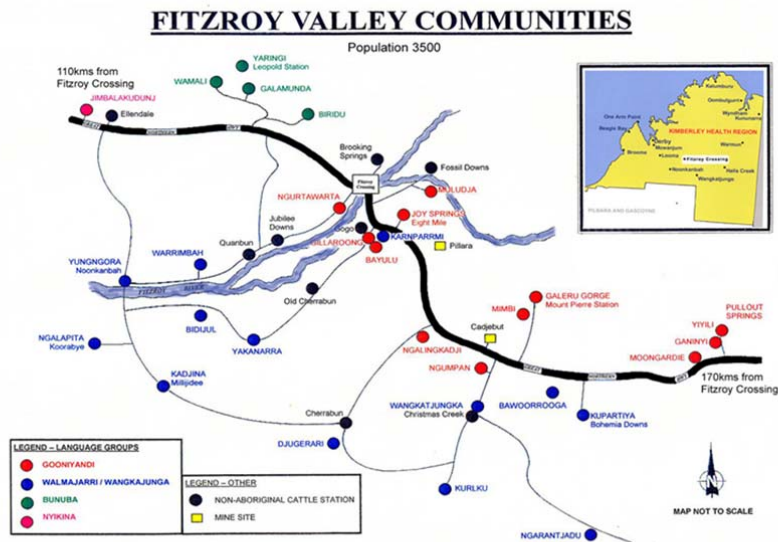
Chapter 5: Disease-Specific Program (Models of Care) Interventions to Improve Health Outcomes

5.1 Introduction

In this chapter the implementation of two disease-specific public health programs to improve health outcomes at a population level are evaluated. A population health approach requires programs to prevent, detect and treat disease and its risk factors over a lifespan based on epidemiological data, as well as single ‘one-off’ medical interventions for high-risk or sick individuals. First, is an evaluation of the implementation of an ear health pathway for the systematic management of chronic middle ear disease in a population with a very high burden of ear disease. Second, is an evaluation of a systematic approach to managing diabetes in partnership with the community-controlled health service. The cases in this chapter describe two public health programs implemented in remote northern Australia. The data for each case study were collected and analysed using the same case study instrument as in the previous chapters to provide an analysis of what aspects of a population health approach to health service delivery for Aboriginal and Torres Strait Islander people are most effective in bringing about improvements in their health outcomes.

5.2 Case Study 5 – Evaluation of an Ear Health Pathway in Remote Communities: Improvements in Ear Health Access

5.2.1 Context



This case study describes and evaluates an ear health program (EHP) aimed at improving the management of middle ear pathology in the Fitzroy Valley via increased access to primary health care and ear, nose and throat (ENT) specialists. The Fitzroy Valley is a remote area in the Kimberley region of Western Australia. The population is estimated to be about 3,000 people, of whom the majority are Aboriginal. Approximately 1,500 people live in Fitzroy Crossing, with the remainder of the population reside in over 40 small communities around the valley. Clinical services are provided via a small hospital in Fitzroy Crossing, and community health outreach to communities and schools throughout the Fitzroy Valley in partnership with a community-controlled health organisation, Nindilingarri Cultural Health Services, which provides non-clinical health services.

In November 2010, 86 children (96% of enrolment) were screened for middle ear disease at a school in the Fitzroy Valley as part of the school health program. Seventy-four per cent of children had middle ear disease, 14%, required urgent

referral to specialist ENT services and 62% required ENT referral overall. This very high level of middle ear disease highlighted the need for a systematic approach to ear health to increase access to care and improve program effectiveness, leading to the introduction of the Ear Health Pathway (EHP).

5.2.2 Intervention

The overall assumption behind this intervention was that providing evidence-based care for chronic middle ear disease by implementing the EHP would reduce its prevalence and morbidity. The implementation assumption was that adapting the model of care to overcome barriers to care would increase the efficacy and impact of the intervention. The case study was an intervention study and answered the question – “will the introduction of an ear health pathway result in a more effective model of care for chronic middle ear disease for Aboriginal and Torres Strait Islander children in the Fitzroy Valley?” In this thesis the case study was used as data to identify effective attributes of the intervention.

A retrospective audit was conducted of individual medical records and referral letters to ENT specialists during the previous 18 months for all children under 18 years of age with a place of residence in the Fitzroy Valley. The referral process and clinical management were audited against the local and national ear health guidelines for completeness of information in the referral letter and appropriate primary care management of cases.

Input - Ear health pathway

The audit analysis and best practice guidelines were used to develop and implement the Ear Health Program (EHP) within the health service, in order to ensure high-quality referrals and a more patient-centred approach to continuity of care and follow-up. The EHP consisted of: an electronic referral template, ear health

nurse, ear health educator and telehealth ENT specialist review.

First, an electronic referral template to capture the essential data required to enable ENT specialists to review cases remotely was developed using the existing electronic medical record. A telehealth service with ENT specialists using the electronic template and video-otoscopic images was integrated into the existing visiting ENT service. Second, staff training was provided for the guidelines, referral template and equipment (video otoscopy, audiometry and tympanometry). Finally, the appointment of an ear health nurse to the community health team to support patients, coordinate screening and referrals, and provide follow-up with ear health Aboriginal Health Workers. Education was provided for patients and their families about middle ear disease risk factors and how to manage it, for example, by tissue spearing. Engaging and educating the caregiver responsible was seen as particularly important, given their key role in ensuring administration of medications and optimal care. In addition, health promotion activities were provided in partnership with Nindilingarri Cultural Health Services. The team also worked closely with the community health team and school health nurse as part of local integration, instead of as a separate specialist team as occurred in other towns nearby.

Output- increased screening

The key output was the number of children screened and referred to ENT for management of their middle ear disease. There was a marked increase in the number of children screened and referred to ENT in the second 18-month period: 148 to 710 and 35 to 67 respectively.

Outcomes- improved management of chronic middle ear disease

After the introduction of the EHP there were improvements in referral quality and management, including appropriate antibiotic use and follow-up. Having an ear

health team resulted in increased screening and provision of appropriate antibiotics and follow-up while awaiting review by ENT. Aboriginal children in disadvantaged circumstances are more likely to require antibiotics for the treatment of the chronic middle disease and this was not always recognised by clinical staff used to working in affluent areas where spontaneous resolution of viral ear infections was the norm. This required the implementation of guidelines specific to Aboriginal and Torres Strait Islander children and their burden of disease. The improvement in the quality of referral letters reduced waitlist time and number of clinic appointments required prior to definitive ENT review. In addition, having the essential information available electronically allowed for triaging of cases and clinical decision-making even when patients were absent during the telehealth consultation.

In addition, after the introduction of the EHP, 78% of cases were reviewed via the telehealth service with a decrease in wait time, despite the increased number of referrals. Effectiveness was defined as referral letter completeness (history, otoscopy, tympanometry, audiometry), waiting time until first ENT contact and improved primary care management.

5.2.3 Journal Articles/Data

The paper in Appendix 3a describes this intervention as a population health approach to improving health outcomes for Aboriginal and Torres Strait Islander people and forms the “data” for the analysis of the case study.

5.2.4 Results

Refer to Table 5.1.

Table 5.1 CHEF Findings for Case Study 4: Indigenous Lifescripts-A Tool for Modifying Lifestyle Risk Factors for Chronic Disease

Context and Participants					
All children under 18 years living in the Fitzroy Valley and attending school in the Fitzroy Valley.					
Intervention and Objectives					
Reduce waiting time until ENT review and improve primary ear health care for children with chronic suppurative otitis media.					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible	Ear health pathway Fully met	Screening for middle ear disease Fully met	Improved referral process with nearly twofold increase in numbers of patients referred to ENT (from 32 to 66) Improved primary care management indicators	Decrease wait for ENT review from 141 days to 22 days for ENT review using telehealth	Decreased middle ear disease and hearing loss
Appropriate	Partially met	Partially met			
Effective	Partially met	Partially met			
Responsive	Partially met	Partially met			
Continuous	Partially met	Partially met			
Efficient	Not evaluated	Not evaluated			
Evidence - Data sources	Medical records	Medical records	Medical records	Medical records	Medical records and audit data.

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Assumptions
A systematic approach to ear health and providing evidence based care reduces morbidity due to middle ear disease.

External Factors
Social determinants of health influence risk factors (smoking, diet, overcrowding, income, education) for middle ear disease.

5.2.5 Analysis

Input

Due to the plausible linkage between inputs, outputs and outcomes using the analysis tool, the school-based ear health pathway was an effective model and likely to be effective in the long term. The underlying assumption that providing evidence-based care reduces morbidity was based on scientific evidence and therefore this intervention focused on translation to context (Leach et al., 2008; Menzies School of Health Research, 2010; Morris, 1998; WHO/CIBA, 1998; WHO, 2004).

Output

Using a systematic approach to the management of ear health including the addition of a dedicated ear health team increased accessibility for children living in that community. This resulted in the number of children screened increasing from 148 over 18 months to 710. The approach focused on early intervention and education around prevention, which was considered appropriate. The combination of primary, secondary and tertiary intervention provided a continuous approach across the school-aged cohort. This intervention was effective in this context and the implementation model achieved its output objective of increased screening for chronic middle ear disease. This program was provided in response to a high community burden of disease, but the community was not formally asked the question as to whether this intervention met their needs. The intervention involved Aboriginal Health Workers in order to be as responsive to the community members as possible. From a population health approach this community-level targeted intervention was continuous and provided screening and long-term follow-up. In addition, the intervention was targeted to the appropriate age groups based on population-level data.

The CHEF tool demonstrated that using a systematic approach to implement best practice guidelines for the management of ear health was effective in the context of this case study with the potential to achieve high screening rates, timely referral rates, and potentially a decrease in morbidity due to ear disease and its complications (Table 5.1). Using a systems approach to the management of ear health was an accessible, appropriate and effective intervention in this context, resulting in an increase in the number of children screened. In addition, the intervention was targeted to the appropriate age groups based on population-level data. The efficiency of using the ear health pathway was not calculated in monetary terms but providing telehealth potentially saved on the costs of bringing the specialist team up from Perth; there is also evidence that using telehealth is an efficient use of resources to achieve the desired results (Elliott et al., 2010; Hofstetter et al., 2010; Smith et al., 2012).

5.2.6 Lessons Learnt From the Case Study

Epistemology, theory and evaluation

This pragmatic intervention trial of a model of care for middle ear disease in school-aged children highlights the importance of modifying national programs and resources to the local context. This intervention used empirical research evidence for the management of middle ear disease and adapted it to the local context to improve the effectiveness and efficiency in achieving the expected outcome. This approach to improving health outcomes highlights the importance of adapting an intervention in a way that is accessible and equitable. This case study measured the outputs, short-term and medium-term impact. Due to the logic model and the linkage between inputs, outputs and outcomes – the goal of reducing morbidity due to chronic ear disease are anticipated in the longer term. The constructivist approach to exploring

alternative methods of implementing programs and the importance of multiple understandings of how the intervention would work by the different stakeholders, including the Aboriginal Health Workers was a useful aspect of a population approach in this case study.

Translating research evidence into health service delivery

This intervention used available research evidence of the effectiveness of best practice ear health management and the effectiveness of using telehealth to increase access to care and combined them with the local experience and knowledge of health professionals to develop a more effective model of care.

This case study enabled the researchers to test their primary assumption that a systematic approach using an ear health pathway would increase the effectiveness of the ear health program as a disease-specific model of care. The case study illustrated the effectiveness of using telehealth as part of a population health approach to increasing access to health services for middle ear disease. The logic model evaluation was used to assess the second assumption that evidence-based care would improve long-term ear health outcomes and, based on the achievement of the short- and medium-term impacts, this seems likely. The evidence about the benefits of early screening and intervention for hearing loss in children suggest that this intervention would be an efficient use of resources to achieve the desired results at a community level. (Coates et al., 2002 , Menzies School of Health Research, 2010, Williams & Jacobs, 2009)

Integration

This intervention demonstrated the potential increase in impact by integrating the ear health team with the health promotion team and the school child health program. An isolated ear health screening team would have duplicated services and

increased costs. Integration with the primary health care team meant that the local community health team were able to help with long-term follow-up of children and provide screening and primary care opportunistically for children who were missed at school. This approach has the potential to provide coverage of the whole population at risk and the additional benefit of integration with the school health programs already being provided by primary health care services. This was enabled by a systems approach to health promotion, screening, primary care management and tertiary referral. A strength of this approach was coverage of the whole cohort at risk and the strong emphasis on early detection and best practice management in a systematic manner. Developing and implementing the ear health pathway as a way to increase screening for middle ear disease and improving access to best practice primary health care and ENT review seemed to be an effective strategy. It highlighted the importance of integration into a current primary health care services and local involvement to make it effective. Ongoing funding and sustainability are more likely for this program due to the large cost saving of reducing the need for face to face visits by and ENT specialist for initial assessment and management of middle ear disease.

Addressing the social determinants of health using multiple-level strategies

This very high burden of chronic middle ear disease is only seen in disadvantaged populations, usually in developing countries. Addressing the underlying causes – for example overcrowding and poor nutrition – may have eliminated the need for this program altogether, but this primordial approach is outside of the jurisdiction of the health service. This study attempted to mitigate the impact of the social determinants of health on this population by providing health promotion, screening and early intervention. In addition, the national childhood

immunisation program also has an impact in reducing bacterial middle ear disease. (Casey et al., 2004; Cripps et al., 2005; Morris et al., 2005). Providing an ear health team that travelled out to local communities and transported patients in to Fitzroy Crossing for telehealth appointments were attempts to increase access and overcome the lack of transport at a family level, and overcome the distance barrier to timely ENT review.

Community participation

Using local health professionals and Aboriginal Health Workers enabled some input from the local community members, but this was not sought in a formal manner. The opportunity to get feedback and involve stakeholders, particularly community members and Aboriginal Health Workers, may have improved the effectiveness of the strategy in the long term.

5.3 Case Study 6 – Management of Type 2 Diabetes: A Community Partnership Approach

5.3.1 Context

The Fitzroy Valley is a remote region of the Kimberley in Western Australia. More than 80% of the population are Indigenous Australians with 86% aged less than 50 years. The Fitzroy Crossing Hospital (Fitzroy Valley Health Service or FVHS) and the Kimberley Population Health Unit (KPHU) are both funded by the State Health Service and provide services in Fitzroy Crossing and outreach clinics in the larger surrounding communities. ‘Healthy for Life’ is a Commonwealth program aimed at improving the health of Aboriginal and Torres Strait Islander people. It funds dedicated chronic disease and maternal and child health positions in Fitzroy Crossing through KPHU. The Nindilingarri Cultural Health Services (NCHS) is a Commonwealth-funded Aboriginal medical service; it provides non-clinical health

services for the Fitzroy Valley, for example environmental health and health promotion. Over the past 10 years, as part of a formal partnership agreement, FVHS, KPHU and NCHS have moved towards an integrated primary health care model.

A prevocational placement in public health for resident medical officers (RMOs) was commenced at the Kimberley Population Health Unit (KPHU) under the supervision of the public health physician in 2001 and involved a 24-week placement. In 2010, the regional public health physician was successful in receiving funding to expand the program from two to four 24-week RMO placements per year. The placement scope was broadened to include non-communicable, as well as communicable diseases (Hoffer, 2014). This second position focused on chronic disease and provided the secretariat for the regional chronic disease committee.

5.3.2 Intervention

The overall assumption behind this intervention was that providing comprehensive evidence-based care for diabetes would reduce the prevalence and morbidity due to diabetes. The implementation assumption was that adapting the model of care to context to overcome barriers to care in partnership with the community-controlled health organisation would increase the efficacy and impact of the intervention. The case study was an intervention study to answer the question – “will the introduction of a diabetes team and a systems approach result in a more effective model of care for diabetes for Aboriginal and Torres Strait Islander people in the Fitzroy Valley?”

Between March and September 2010, the KPHU resident public health medical officer (RMO) spent 3 days a week in the Fitzroy Valley working with the hospital, the NCHS health promotion team, KPHU community health and the Healthy for Life staff. This was to trial the regional chronic disease strategy

developed by the chronic disease committee, chaired by the regional public health physician.

Input – Systematic approach to diabetes management

Redesign of the health delivery system included two key components: the development of interdisciplinary care teams in partnership with the community-controlled health service and a systems approach to diabetes management that included evidence-based protocols, self-management support and intensive follow-up.

Output – Screening for diabetes and its risk factors

The intervention resulted in regular community health promotion days for screening and education, and team outreach clinics for the development of self-management care plans with patients. The Communicare (Communicare Systems Pty Ltd 1998-2010) software, which was previously utilised predominantly as an acute care medical record, was used to provide a systematic population approach by (a) identifying the population at risk through proactive systematic screening (health checks), (b) developing disease registers, (c) providing intensive follow-up (recalls), (d) best practice care using the electronic decision support (Chronic Disease Care Plans and Diabetes Annual Cycle of Care templates) and (e) using this electronic information in an audit cycle as a continuous quality improvement tool.

Outcomes- improved management of diabetes

Statistically significant improvements in foot examination, body mass index, urine albumin creatinine ratio, total cholesterol, triglycerides and visual acuity measurements were observed. Significant increases in the proportion of patients achieving serum cholesterol and triglycerides therapeutic targets occurred. Most other outcome indicators demonstrated a non-significant improvement, which may

be due to the short six month interval in the audit for potential change.

5.3.3 Journal Articles/Data

The paper in Appendix 3b describes this intervention as a population health approach to improving health outcomes for Aboriginal and Torres Strait Islander people and forms the “data” for the analysis of the case study.

5.3.4 Results

Refer to Table 5.2.

Table 5.2 CHEF Findings for Case Study 6: Management of Type 2 Diabetes: A Community Partnership Approach

Context and Participants					
Type 2 diabetics living in the Fitzroy Valley and attending the Fitzroy Valley Health Service.					
Intervention and Objectives					
Implementation of a culturally appropriate population health (evidence-based, identifying people at risk, auditing outcomes, multidisciplinary team) approach to diabetes management.					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	Systematic approach Fully met Partially met Partially met	Screening for diabetes and its risk factors Fully met Partially met Partially met	Diabetes annual cycle of care indicators achieved	Improvements in quality of care indicators	Long-term decrease in mortality, morbidity and risk factors related to diabetes expected based on evidence in the literature but not assessed
Responsive Continuous Efficient	Partially met Fully met Not evaluated	Partially met Fully met Not evaluated			
Evidence - Data sources	Medical records, annual reports	Medical records, annual reports	Medical records, annual reports	Medical records, annual reports	Mortality data, AIHW data collections

Assumptions
Providing evidence based care in partnership with the community reduces mortality and morbidity due to diabetes

External Factors
Social determinants of health influence risk factors (smoking, diet, exercise, income, education) for diabetes.

5.3.4 Analysis

Input

Using the logic model analysis tool, the systems-based community partnership approach to managing diabetes was an effective model and likely to be effective in the long term. The underlying assumption that providing evidence-based care reduces morbidity was based on scientific evidence and therefore this intervention focused on translation to context (Bailie et al., 2007b; Menzies School of Health Research, 2008; Wagner, 1998; Wagner, 2000; WHO, 2005). A significant component of this translation was working closely with the community-controlled health service to provide a more culturally appropriate program. Using a systematic approach to the management of diabetes in this context with a community partnership approach was considered an accessible, appropriate and effective intervention in this context.

Output

Accessibility was increased by developing a team and sending the team out to the remote communities. The approach focused on screening, early intervention and education around prevention, which was considered appropriate. The combination of primary, secondary and tertiary intervention provided a continuous approach across the cohort and over the lifespan. This intervention was effective in this context and the implementation model achieved its short- and medium- term goals. The program was provided in response to a high community burden of disease. While the community was not formally asked the question as to whether this intervention met their needs, the intervention was done in partnership with the community-controlled organisation in order to be as responsive to the community as possible. From a population health approach this targeted community-level intervention was

continuous due to the health promotion component, the identification of risk factors, screening and tertiary prevention provided when diabetes was diagnosed. In addition, the intervention was targeted to the appropriate age groups based on population-level data. The research evidence in the literature about the benefits of early intervention and prevention for diabetes at a population level suggest that this intervention would be an efficient use of resources to achieve the desired results at a population level (Bailie et al., 2007b; Gillies et al., 2007; Diabetes Prevention Program Research Group, 2002).

The CHEF tool demonstrated that using a systems approach for the screening and management of diabetes in partnership with the local community-controlled health services was effective in achieving high screening rates, improved quality of care indicators and potentially a decrease in morbidity and mortality (Table 5.2).

5.3.5 Lessons Learnt From the Case Study

Epistemology, theory and evaluation

This pragmatic intervention trial of a model of care for diabetes in a remote community highlights the importance of modifying national programs and resources to the local context. The constructivist approach to exploring alternative methods of implementing programs was a useful aspect of a population approach in this case study. Although using a constructivist approach to the intervention, and a desire to understand how the intervention could best be adapted to the context, the evaluation was still largely pragmatic and the opportunity to explore the methodology as a mechanism more fully was missed. A realist evaluation could have looked at contextual risk factors and perhaps determined what worked about the intervention and for which group it was more effective and why. This may have identified areas for further research around other additional strategies or interventions that may have

further increased the effectiveness and gained a better understanding of the context and mechanism and their relationships to the outcomes.

This approach to improving health outcomes highlights the importance of adapting an intervention in a way that is accessible and equitable. This case study measured the outputs and the short-term and medium-term impact, due to the logic model linkages the goal of reducing the morbidity and mortality due to diabetes is anticipated in the longer term. This case study also illustrated the effectiveness of using a systematic evidence-based program and the logic model evaluation was used to assess the long-term health outcomes based on the achievement of the short- and medium-term impacts.

Translating research evidence into health service delivery

This intervention used evidence of best practice management for diabetes and the local knowledge and expertise to adapt it to the local context to improve the effectiveness in achieving the expected outcome. The case study enabled the researchers to test their assumption that a systems approach using best practice care in partnership with the community-controlled health organisation would increase the effectiveness of diabetes management as a disease-specific model of care. The evidence in the literature around the benefits of early screening and intervention for diabetes suggest that this intervention would be an efficient use of resources to achieve the desired results at a community level.

Integration

This intervention demonstrated the potential increase in impact by developing the diabetes team and integrating with the health promotion team and the chronic disease program. A strength of this approach was coverage of the whole cohort at risk and strong emphasis on primary, secondary and tertiary prevention in a

systematic manner using the electronic decision tools and patient management systems. This combined approach in partnership with the community controlled health service was an effective approach with the potential to improve health outcomes in the long term. The partnership was an effective population health approach for adapting and implementing the program. Working in partnership with the community-controlled health service health promotion unit enabled access to the community and health service delivery in culturally appropriate and coordinated ways that otherwise may not have been possible. The integration of this new model of care as part of the reorientation of the health service described in case 7 assisted with long term sustainability.

Addressing the social determinants of health using multiple-level strategies

The very high burden of chronic disease, including diabetes, is a feature of disadvantaged populations. Addressing the underlying causes, such as, poverty, unemployment and poor nutrition – may have had a much larger impact on decreasing diabetes, however, this was outside of the jurisdiction of the health department program. This population-level intervention was found to be effective as a population health approach. The addition of multiple strategies to address other risk factors and the underlying factors responsible for the socioeconomic determinants of health would have made the intervention more effective in achieving greater improvements in health outcomes in the long term.

Community participation

Using local health professionals and Aboriginal Health Workers and working in partnership with the community-controlled health service enabled some input from the local community members, but this was not sought in a formal manner. The opportunity to get feedback and involve stakeholders, particularly community

members, is likely to have improved the effectiveness of the strategy in the long term.

5.4 Chapter Summary

In Case Study 5, the CHEF tool demonstrated that the implementation of an ear health pathway as a disease-specific protective intervention was effective in achieving high coverage rates for screening and timeliness for ENT review, likely to achieve the long-term goal of reducing morbidity due to ear infection. The disease-specific program intervention case study used a pragmatic exploratory approach to consider whether providing an ear health pathway would be effective as a population health approach to improving health outcomes in the context of the program. The logic model evaluation highlighted the importance of the socioeconomic environment and using multiple interventions for maximising the impact of a program to improving health outcomes in the long term. This was an effective intervention due to the systematic approach, integration with local health services as well as combining health promotion, screening, disease management and tertiary review.

In Case Study 6, the CHEF tool demonstrated that a population-level intervention combining screening and high-risk targeted approaches was effective in achieving high screening rates, likely to achieve the long-term goal of reducing morbidity and mortality due to diabetes in this context. The diabetes model of care intervention case study used an exploratory trial approach to consider whether a more comprehensive systems approach to diabetes management, in partnership with the community, would be effective as a disease-specific approach to improving health outcomes. The logic model evaluation highlighted that long-term outcomes

would be dependent on the socioeconomic circumstance of the population. This also emphasised the importance of considering the socioeconomic environment and using multiple interventions for maximising the impact of a program to improving health outcomes in the long term. This case study illustrated the potential effectiveness of a more culturally appropriate, integrated approach to health promotion and diabetes management as part of a population health approach to reducing the impact of diabetes. It was determined that this was an effective intervention due to the systems approach, integration with local health services as well as combining health promotion, screening, disease management and tertiary review. The focus on integration with community-controlled health service was also important.

Chapter 6: Health Service Reorientation to Improve Health Outcomes

6.1 Introduction

In this chapter the implementation of health service strategies to improve health outcomes at a health service level by changing the health service context are evaluated. The development of a health service partnership between the state health service and the community-controlled health service in a remote area is described and an evaluation of the health service impact as primary health care services were strengthened is presented.

The case study in this chapter describes the development of the partnership and subsequent reorientation of health services in remote northern Australia. The data for the case study were collected and analysed using the same case study instrument as in the previous three chapters. This provides an analysis of what attributes of a population health approach to health service delivery for Aboriginal and Torres Strait Islander people are effective in bringing about improvements in their health outcomes.

6.2 Case Study 7 – Community Participation in Strengthening Primary Health Care: Achieving Health Gains in a Remote Region of Australia

6.2.1 Context

The Fitzroy Valley in the Kimberley region of Western Australia covers an area of 30,000 km² with a population of approximately 3,500 people dispersed across 44 communities. More than 80% of the population are Indigenous Australian with

86% aged less than 50 years. The main township, Fitzroy Crossing (population 1,600), is centrally located and contains the state government-funded hospital and community clinic, and the Commonwealth-funded Aboriginal community-controlled health service – Nindilingarri Cultural Health Service (NCHS). The Fitzroy Crossing hospital (Fitzroy Valley Health Service or FVHS) and the Kimberley Population Health Unit (KPHU) provide services in Fitzroy Crossing and outreach clinics in the larger surrounding communities. Nindilingarri Cultural Health Services (NCHS) is an Aboriginal medical service providing non-clinical health services for the Fitzroy Valley. Over the past 8 years – as part of a formal partnership agreement – FVHS, KPHU and NCHS have moved towards an integrated primary health care model as described in the intervention below.

The underlying assumption that community participation in health service delivery improves health outcomes, although strongly advocated for by the WHO, has limited evidence in the literature (Bath, 2015). This intervention adds to this body of evidence. The simultaneous timing of community readiness for change and the development of a supportive political context resulted in a local environment that enabled the establishment of a formal partnership.

6.2.2 Intervention

The overall assumption behind this intervention was that local community leadership in strengthening primary health care services at a local health service level would achieve health service reform, leading to improvements in health outcomes. The implementation assumed that building the community partnership would increase the efficacy and impact of the intervention. A unique community-initiated health service partnership was developed between a community-controlled Aboriginal health organisation, a government hospital and a population health unit in

order to overcome the challenges of delivering primary health care to a dispersed, highly disadvantaged Aboriginal population in a very remote area.

The case study was an exploratory study to answer the question – “will community involvement in health service reform to strengthen primary health care result in a more effective health service for Aboriginal and Torres Strait Islander people in the Fitzroy Valley?” The case study is used in this thesis as data to identify attributes of population health interventions that contribute to improving health outcomes.

The aim of strengthening primary health care services was to reorientate the existing health services from an acute reactive approach (largely episodic and reactive to patient-initiated presentations) to a more comprehensive primary health care approach. This new approach involved the integration of health promotion, health assessments and chronic disease management with an acute primary health care service as a result of the formal partnership.

Input - Supportive government policy, Commonwealth/State relations and community readiness for change

Fitzroy Valley community members became increasingly concerned about the burden of disease among their families and participated in an extensive consultation process over several years led by Aboriginal community leaders and elders to achieve consensus on how to further improve health services. This led to the formation of the community- controlled health service organisation, Nindilingari Cultural Health Services in 1995. After a second two-year period of community consultation led by local community leaders it was decided that a formal partnership between the health department and the community-controlled organisation would be

the best way forward. An opportunity arose with the national reform agenda (National Health Reform, 2011) resulting in Commonwealth funding for dedicated primary health service provision. Western Australian State Health Council of Australian Governments (COAG) funding in 2010 provided additional resources in the form of a primary health care doctor and primary care staff for community clinics outside of Fitzroy Crossing.

Output – The formal partnership

As part of the formal partnership agreement a framework delineating areas of activity, responsibility of each service provider, and a governance structure that would support the framework was developed. The agreement was signed in 2006. A common vision facilitated the pooling of resources to achieve a more comprehensive, holistic and preventive health service with the capacity to address the many ‘upstream’ determinants of health by providing health promotion, disease prevention and early intervention services. The structural changes enabled by the delineation of roles and responsibilities through the partnership agreement resulted in tangible changes in service delivery.

Outcomes – strengthened primary health care services

The shared goals and clear delineation of responsibilities achieved through the partnership reoriented an essentially acute hospital-based service to a prevention-focused comprehensive primary health care service, with a focus on systematic screening for chronic disease, interdisciplinary follow-up, health promotion, community advocacy and primary prevention. The formal partnership enabled the primary health care service to meet the major challenges of providing a prevention-focused service in a very remote and socially disadvantaged area.

The strengthening of primary health care services through dedicated primary

health care funding to deliver targeted primary health care programs across the Fitzroy Valley resulted in increased primary health care staff and the provision of more primary health care programs; for example, men’s health, sexual health, ear health, chronic disease and an expansion of the antenatal program. The reorientation of service delivery and the integration of health promotion, health assessments and chronic disease management with an acute primary health care service provided a more proactive prevention-focused service. There were increases in occasions of service (from 21,218 to 33,753 per year) over the six-year period studied, most notably in primary health care services provided to very remote outlying communities (from 863 to 11,338 occasions of service per year). Health assessment uptake increased from 13% of the eligible population to 61%, leading to 73% of those identified as having diabetes being placed on a care plan. Quality of care indicators (glycosylated haemoglobin [HbA1c] checks and proportion of diabetics on antihypertensives) showed improvements over the six-year study period and there was also a downward trend in mortality that was statistically significant, although fluctuating from year to year due to the small numbers.

6.2.3 Journal Articles/Data

The paper in Appendix 4a describes the formation of the partnership leading to community participation in health service reform; the paper in Appendix 6b describes the ‘Strengthening Primary Health Care: Achieving health gains in a remote region of Australia’ and together they form the “data” for the analysis of the case study.

6.2.4 Results

Refer to Table 6.1.

Table 6.1 CHEF Findings for Case study 7: Community Participation in in Strengthening Primary Health Care: Achieving Health Gains in a Remote Region of Australia

Context and Participants					
The communities and population of the Fitzroy Valley and the primary health care service providers.					
Intervention and Objectives					
Development of a health service partnership between the community-controlled health service and the state health service to strengthen primary health care and improve health outcomes.					
Implementation			Outcomes		
Indicators	Input	Output	Short-term Impact	Medium-term Impact	Long-term Goal
Accessible Appropriate Effective	Supportive local policy and community readiness Fully met Fully met Fully met	Formal Partnership Fully met Fully met Fully met	Aligned vision Local leadership and governance Integrated service delivery Increased primary health care activity and utilisation Increased immunisation rates Increased screening for risk factors	Increased primary care workforce Increased primary care funding Increased quality of care based on national primary health care indicators	A comprehensive preventive health service to address upstream determinants of health Decreased mortality and morbidity Increased community empowerment
Responsive Continuous Efficient	Fully met Fully met Partially met	Fully met Fully met Partially met			
Evidence - Data sources	Policy documents Key informant interviews Health service documents	Partnership Agreement 19(2) exemption Health service records	Partnership Terms of Reference Partnership meeting minutes Health Service records	Annual reports Health service records Medical records	Community feedback Medical records and audit data National health performance data

Assumptions
Community leadership in health service delivery to strengthening primary health care will improve health outcomes

External Factors
Social determinants of health (employment, income, education, marginalisation) influence health outcomes.

6.2.5 Analysis

Community participation in health service reform using a community partnership to strengthening primary health care was an accessible intervention due to extensive opportunities for input by the local community during the two consultation periods. These consultations were led by local community leaders and elders in response to requests from the community for a focus on primary prevention, as well as improving primary medical care. The result of the reorientation was an increase in access to services, particularly for outlying communities.

Responsiveness to the community was not formally assessed but the intervention was done in partnership with the community-controlled organisation in order to be as responsive to the perceived needs of the community as possible. The representation from the community-controlled health services provided formalised input and feedback from the community, leading to appropriate and effective implementation focusing on primary prevention to address upstream factors as well as improving primary care.

From a population health approach this reorientation of health service provision was a whole-of-community intervention using health promotion and screening for risk factors and targeting those at high risk or those with a chronic disease. This approach was continuous across the spectrum of primary to secondary prevention and also targeted to the appropriate age groups based on population-level data. The evidence about the benefits of early intervention and prevention at a population level (Bailie et al., 2007b; Diabetes Prevention Program Research Group, 2002; Gillies et al., 2007; James et al., 2010; Pearson et al., 2003), combined with a targeted approach to high-risk individuals, suggest that this intervention would be an efficient use of resources to achieve the desired results at a population level,

although not formally evaluated.

The CHEF tool demonstrated that using a formal partnership with the community-controlled sector for health service reform to strengthen primary health services was effective, in this case study demonstrated by increased achievement of health service performance indicators compared to national data and a decreased mortality (AIHW, 2014b). Community participation in health service delivery was effective as a mechanism for achieving a common vision leading to increased primary health care capacity and a more integrated health care service. The evidence in the literature around the benefits of investment in comprehensive primary health care suggests that this intervention would be an efficient use of resources to achieve the desired results at a population level, although not formally evaluated in this evaluation (Labonté et al., 2008).

The underlying aim of the reorientation was to make services more appropriate to the needs of the community by increasing the focus on prevention and using a more systematic proactive approach to screening and follow-up for chronic disease. The implementation phase was an effective intervention in achieving the establishment of the formal partnership and enabling the restructuring services to increase primary health care utilisation.

6.2.5 Lessons Learnt From the Case Study

Epistemology, theory and evaluation

The constructivist approach to exploring alternative methods of implementing programs, particularly how community participation in health service delivery could guide implementation and adaption to the context, was a useful attribute of a population approach. In-depth interviews were conducted with key informants involved in the partnership to provide an understanding of the barriers and enablers

to the reorientation and change process (Carroll, 2015). This paper and analysis is not included as a part of this thesis but highlight that the inclusion of a realist evaluation would have added value to the evaluation and provided an understanding of the mechanism of the intervention. Although a community participant semi-structured focus group was planned and the questions developed, time and resources did not allow for it to proceed. This key aspect of realist evaluation may have identified areas for further research about other additional strategies or interventions that may have further increased the effectiveness. A better understanding of the context, mechanism and their relationships to the outcomes may have been gained. Although using a more constructivist approach to the intervention and a desire to understand how the intervention could best be adapted to the context, the evaluation was still largely pragmatic and the opportunity to explore the methodology as a mechanism more fully was missed.

This case used both a pragmatic assessment of quantitative data and a more constructivist epistemology for more detailed exploration of this complex system integration to improving health outcomes for Aboriginal and Torres Strait Islander people. This complex intervention approach to improving health outcomes highlighted the importance of change theory for implementing and adapting an intervention to the context to ensure accessibility and equity. The program logic model used change theory to describe and identify relationships, and enabled the impact of service inputs to be associated with the predetermined output indicators, providing an indication of progress towards long-term health improvements. The logic model analysis of the intervention in the case study enabled the measurement of the changes in primary health care activity and quality of care indicators that, in the long term, should lead to a sustained decreased in mortality and morbidity. This

case study illustrated the effectiveness of using community participation in health service reform and logic model evaluation was used to assess the likelihood of achieving the improvements in long-term health outcomes based on the achievement of the short- and medium- term impacts (Watson et al., 2009).

Translating research evidence into health service delivery

The intervention used recommendations from the literature relating to the importance of community participation and comprehensive primary health care provision to achieve sustainable changes in health service delivery and improve health outcomes and reduce inequities (Humphreys & Wakeman, 2008; Marmot et al., 2008, Macinko & Starfield, 2002; Sibthorpe & Gardner, 2007). This case study enabled the researchers to test their assumption that participation of the community through a formal partnership with the community-controlled health organisation to strengthen primary health care would increase the effectiveness of the health service. This approach to improving health outcomes highlights the importance of community participation in the reorientation of the health services to achieve change in a way that is accessible and equitable. The underlying assumption that strengthening primary health care reduces mortality and morbidity was based on research evidence available in the literature and this intervention focused on translation to context.

Integration

The intervention demonstrated the potential increase in impact of integrating all the health service provision with an aligned vision under local leadership and governance, resulting in more integrated services delivery and increased primary health care activity. This case study illustrated the effectiveness of a systems approach to integrating across the whole health service to provide comprehensive

primary health care services with local community participation. It highlighted the importance of a supportive policy environment and community readiness for change as part of a population health approach to increasing access to health services. A strength of this approach was integration of health services around a common vision with a strong emphasis on comprehensive primary health care focused on: primary risk factor reduction, early disease detection, and best practice management of chronic disease.

The reorientation of health services in partnership with the community-controlled health services was a second important aspect of an effective population health approach for implementing the program. This enabled integration of service provision across the continuum from health promotion to specialist care. The community-controlled health service was able to focus on primary prevention and implemented programs such as community-led alcohol restrictions and smoking cessation programs to address risk factors in the community. Developing and formalising the partnership as a mechanism for reorientating the health service and improving access to best practice primary health care was an effective strategy. It highlighted the importance of integration of primary health care services and the importance of community participation and local involvement to make it effective.

Another strength of this case study was coverage across the whole community and a strong emphasis on primary, secondary and tertiary prevention in a systematic manner, as well as identifying and targeting those at high risk. This combined approach in partnership with the community-controlled health service appears to be an effective approach with the potential to improve health outcomes in the long term.

Addressing the social determinants of health using multiple-level strategies

The very high burden of chronic disease and substance abuse is a feature of

disadvantaged populations. Addressing the underlying causes, such as poverty, unemployment and disenfranchisement, may have had a much larger impact on improving health outcomes in the longer term. This population-level intervention was effective as a population health approach; however, the addition of multiple strategies to address other risk factors and underlying factors responsible for the socioeconomic determinants of health would have made the intervention more effective in achieving greater improvements in health outcomes. Despite a large increase in health service utilisation and primary health care activity there were relatively small gains in quality of care indicators and morbidity and mortality, suggesting that unless we address the underlying social determinants of health then improvement in health outcomes will be limited.

Community participation

Community participation was essential for sustaining the changes, despite the change in health service staff. The community-controlled health service was able to focus on primary prevention and implemented programs such as community-led alcohol restrictions and smoking cessation programs to address risk factors in the community. This provided clear evidence that the community felt empowered to lead in this important area. However, self-determination is one of the longer term goals of the partnership that still has further potential to be achieved.

Sustainability

Health service sustainability is an essential prerequisite for health performance and integral to health services as complex systems. The evaluation framework developed to monitor and evaluate health service performance in this case study included key sustainability indicators (Sibthorpe & Gardner, 2007; Wakerman et al., 2008). The fulfilment of these requirements was critical to achieving the outcomes.

The formal partnership agreement enabled increased funding, a dedicated primary health care workforce, a single integrated governance structure and service integration through shared infrastructure. The importance of aligned and consistent policy for sustainability and the achievement of long-term outcomes also became apparent as shown in Table 6.2.

Systems approach

Kotter's (1995) steps for successful organisational change were used to analyse the change process. Reorientation of health service delivery was closely aligned with known steps for successful organisational change across the whole system: (i) creating a climate for change, through community participation and leadership; (ii) engaging and enabling the whole organisation, achieved through the formal partnership; and (iii) implementing and sustaining change, through the new integrated health service. The key elements of the change process are summarised in Fig. 3 of the paper.

Figure has been removed due to Copyright restrictions.

Figure 6.1 Application of the steps described by Kotter (1995) to the primary health-care change process in the Fitzroy Valley.

Identifying Kotter's (1995) principles for successful, sustainable organisational change, together with a logic framework linking an improved structure to improvements in process and outcomes (Watson et al., 2009), support the conclusion that systems approach to changes described in this case study are sustainable and will improve health outcomes.

Table 6.2 Summary of Key Sustainability Requirements Linked to Policy and Logic Model

			Population Health Goals and Outcomes		
Policy Goal	Policy Input	Service Output Goals	Short-term	Medium-term	Long-term
<ul style="list-style-type: none"> • Effective, sustainable primary health care (PHC) services in rural and remote Australia 	<ul style="list-style-type: none"> • Strengthen primary care 	<ul style="list-style-type: none"> • Increase PHC activity & utilisation through better access to appropriate PHC services 	<ul style="list-style-type: none"> • Increased health promotion & prevention of avoidable secondary & tertiary care 	<ul style="list-style-type: none"> • Improved quality of care 	<ul style="list-style-type: none"> • Equitable health outcomes
1. Environmental Enablers		Impact on Service	Indicators		
<ul style="list-style-type: none"> • Supportive policy 	<ul style="list-style-type: none"> • Supportive PHC policy following COAG agreement, including H4L funding 	<ul style="list-style-type: none"> • PHC programs: <ul style="list-style-type: none"> Maternal & child health Men’s health Chronic disease Drug & Alcohol Smoking cessation • Emergency Department presentations – non urgent categories 4 & 5 • PHC occasions of service 	<ul style="list-style-type: none"> • Health assessments • Immunisation coverage • Proportion of patients with chronic disease receiving planned care • Screening for risk factors • Mean primary care episodes • More equitable access 	<ul style="list-style-type: none"> • Proportion of diabetics on a care plan • Risk behaviours • Proportion of diabetics reaching HbA1C targets • Proportion of diabetics reaching BP targets • Proportion of regular attendees 	<ul style="list-style-type: none"> • Smoking rates • Unsafe alcohol use • Mortality
<ul style="list-style-type: none"> • Commonwealth–State relations 	<ul style="list-style-type: none"> • COAG agreement on 19.2 exemption 				
<ul style="list-style-type: none"> • Community readiness 	<ul style="list-style-type: none"> • Fitzroy Valley Partnership agreement 				
2. Essential Service Requirements					
<ul style="list-style-type: none"> • Workforce 		Increased PHC workforce from H4L & State COAG funding			
<ul style="list-style-type: none"> • Funding 		Incentivised PHC \$ from 19.2 exemption			
<ul style="list-style-type: none"> • Governance, management & leadership 		Unified vision for PHC activity following partnership agreement			
<ul style="list-style-type: none"> • Linkages 		Improved service integration partnership agreement			
<ul style="list-style-type: none"> • Infrastructure 		Shared infrastructure leading to effective service integration			

6.4 Chapter Summary

In Case Study 7, the CHEF tool demonstrated that community participation in health service delivery through a formal partnership between the government health service and community-controlled health service was effective in achieving a more integrated and comprehensive primary health care service. The reorientation of health service delivery to strengthen primary health care services was effective in achieving high screening rates likely to achieve the long-term goal of reducing morbidity and mortality in this context.

The intervention case study used a complex systems approach to consider whether a systems level reorientation of health service delivery in partnership with the community would be effective as a population health approach to improving health outcomes in the context of the program. The case study highlights the importance of change theory and systems theory for complex systems integration. The reorientation of the health service to ensure community participation in health service delivery was considered to be effective as a population health approach to improving health outcomes in the context of the program. In addition, the logic model evaluation highlighted the importance of considering the socioeconomic environment and using multiple interventions for maximising the impact. The long-term outcomes are dependent on the socioeconomic circumstances of the population. This case study illustrated the potential effectiveness of a more culturally appropriate, integrated community approach to health service delivery to strengthen primary health care as part of a population health approach to reducing the impact of disease.

Chapter 7: Discussion and Conclusions

7.1 Introduction

This thesis aims to address the gap in evidence identifying effective population health interventions that have been implemented and evaluated to improve health outcomes for Aboriginal and Torres Strait Islander people in rural and remote areas. In Chapters 3–6 published articles describing the adaption of health service interventions to the local context have been described and brought together as a case series. These seven case studies use program-model analysis to answer the research question, what aspects of the interventions were effective in improving health outcomes?

The CHEF tool was developed from the health service evaluation framework as a data collection and analysis tool to identify the individual program logic model for each case. The CHEF tool was then used to analyse each intervention using key health service evaluation indicators. Each case was then compared against the Canadian Population Health template in order to identify attributes that may have influenced success in translating and implementing the intervention.

This chapter draws out the main findings from the results of each case study to identify effective aspects of the intervention and identify the common themes across the series that are applicable in the context of rural and remote Aboriginal and Torres Strait Islander health service delivery. In Chapter 1, I presented the Canadian Population Health template with its eight key elements as an example of a population health approach that could be used in the context of rural and remote Aboriginal and Torres Strait Islander health. Chapter 2 describes the methodology and how the case

studies have been categorised and grouped into chapters based on the population health impact pyramid described by Freiden (2010). This grouping also reflects their chronological implementation and developments in population health and research evaluation during this time (Edwards, 2012; Freiden, 2010).

Chapter 3 describes Case Study 1, the theoretical implementation of RSV prophylaxis as a single clinical intervention. In Chapter 4, the implementation of HPV vaccination (Case 2), the expanded practice for remote paramedics (Case 3), and the development of the Indigenous Lifescripts resources as long-lasting protective interventions (Case 4) are described. Cases 5 and 6 illustrate the implementation of disease-specific comprehensive models of care for chronic middle ear disease and diabetes, respectively. The previous chapter described the reorientation of the health service through community participation in Case 7. After the analysis of the seven case studies I propose that although each of the elements of this model has merit, my findings suggest a different emphasis for the key elements essential to an effective approach to adapting population health interventions to remote Australia including the importance of:

- Test evidence-based assumptions in context
- Maximise the population impact
- Address the social determinants of health using multiple-level strategies
- Integrate with existing services
- Aligning implementation epistemology, theory and evaluation methodology to ensure accountability for outcomes and
- Empower the community.

Finally, the critical role of addressing each of these key elements when

translating research evidence into health service delivery became apparent in order to address the complex social and health problems faced by disadvantaged populations.

7.2 A Population Health Approach

Public health has evolved over the past few decades from an epidemiological, biomedical, legislative focus on infectious disease control to what is now described as the “New Public Health” (Baum, 2015). This new approach has been strongly influenced by the World Health Organization and recognition that social and economic circumstances have a greater influence on our health than that suggested by traditional biomedical models (Lynch, 2004). A population health approach is an aspirational approach to improving health outcomes, the important principles of which have been described in the series of WHO declarations from Health for All in the Alma Ata Declaration to the more recent focus on health equity through universal health coverage reflected in the current Sustainable Development Goals (Sachs, 2012). There is no consensus in the literature regarding the definition of a population health approach and it is considered by some as synonymous with public health.

For the purposes of this thesis the broader definition of a population approach and the schematic model proposed by Kindig & Stoddart (2003) is used and further developed for the rural and remote Australian context based on the findings of this thesis. Population health focuses on improving the health outcomes of a group of individuals, including the distribution of outcomes within the group (Kindig & Stoddart, 2003). Population health intervention research examines the impact of policies and interventions with the interactions of the determinants of health (Hawe & Potvin, 2009.). This approach also suggests that the solutions to inequitable health outcomes require approaches that are comprehensive, complex and include the

socioeconomic and political environment. This dissertation describes the application of this approach to health service delivery in rural and remote areas to improve the health outcomes of Aboriginal and Torres Strait Islander people.

7.3 Program logic of CHEF tool

Measuring health outcomes to ensure improvements for the population as a whole, but in particular for those who are disadvantaged, is the focus of population health intervention research (Hawe & Potvin, 2009). Measuring health outcomes can be difficult however, as improvements in health outcomes take time and are influenced by many factors, not just the interventions under evaluation. In Case Study 7, health service reorientation, an evaluation framework was developed to overcome these challenges and take into account some of the complex factors involved. The evaluation framework developed for use in rural and remote health service delivery uses program logic which is based on Change Theory. Change Theory proposes that causal linkages exist in any intervention, between its shorter-term, intermediate, and longer-term outcomes. The identified changes can be mapped showing each outcome in logical relationship to all the others, as well as chronological flow. Reeve's framework builds on the work of Bailie et al., (2013) and is the only evaluation tool combining the concepts and integrating primary and hospital service evaluation developed empirically for the rural and remote Australian context that we are aware of (Reeve et al., 2015). This health service evaluation framework was further modified and used as the case study analysis tool – CHEF – for this thesis and was retrospectively applied to each of the published articles (case studies).

The use of the CHEF tool across all the cases in this thesis provided a consistent program model evaluation. This enabled me to consider the associations

between inputs, outputs, and predictions about longer term outcomes, based on the underlying assumptions and take external factors into account. The use of the CHEF tool enabled me to make explicit my judgements regarding the effectiveness of each population health interventions and allowed inter-rater comparisons with my primary supervisor. This improved the dependability of the findings for each case and enabled comparisons across the case series. The CHEF tool also made explicit the underlying assumptions (drawn from the literature and each team's previous experience) and the external context revealing the world view of the stakeholders engaged in each population health intervention. Again this reflects Change Theory's more recent focus to ensure transparent distribution of power dynamics and inclusion of many perspectives (Brest, 2010). Change theory challenges us to consider structure and processes in population health interventions in order to support and achieve the desired outcomes. The program logic model can be used to describe and identify the linkages important for organisation change. This enables the impact of service inputs to be associated with predetermined output indicators, providing an indication of progress towards long-term health improvements.

7.4 Align Epistemology, Theory and Evaluation

The CHEF logic model used in this case study series allowed me to evaluate the effectiveness of the interventions using a graphic depiction of the logical/plausible relationships between the inputs, outputs and outcomes. This enabled me to determine the value of aligning intervention teams' epistemologies with appropriate intervention theories and evaluation methods. As I used the CHEF tool for the case study analysis, an important pattern emerged from the cases, demonstrating the importance of the alignment of epistemology, theory, and evaluation methods. This model is illustrated in Figure 7.1 and the case study

evidence described below.

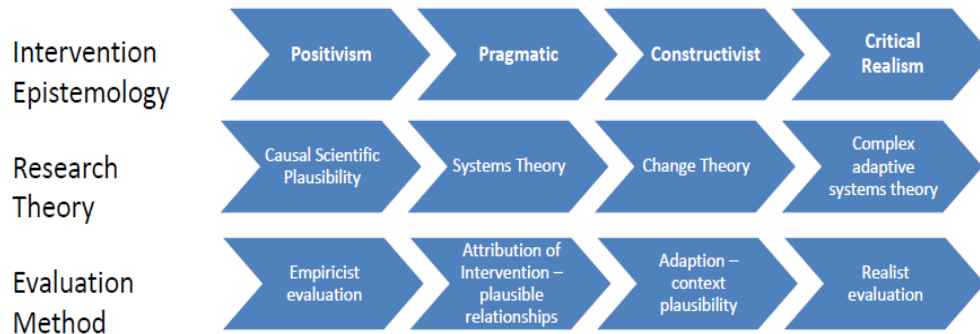


Figure 7.1 Aligning epistemology, theory and evaluation methods.

The first case study built on literature with a very scientific positivist perspective. This epistemology assumes that truth is inert, and preferences quantitative data to find patterns in nature. The literature demonstrated that Palivizumab was efficacious for RSV immune-prophylaxis using a casual-scientific plausibility research approach and evaluated this through empirical randomised control trials. The intervention in this first case study sought to model RSV prophylaxis in infants to answer the research question “can this biomedical intervention achieve the desired outcomes when applied to this context?”

A more pragmatic epistemology recognised the need to develop an intervention which could explore the effectiveness of immunoprophylaxis within this new context. The evaluation involved exploratory methods: calculating risk of admission to Townsville hospital with RSV infection and the cost of the drug as a clinical intervention. During the analysis it became apparent that the intervention team’s underlying assumptions were incorrect.

The epistemology of the subsequent five case studies was pragmatic.

Pragmatic epistemology uses models that attempt to represent the environment in a way that maximises problem-solving, no model can ever capture all relevant information, therefore the model chosen will depend on the problem to be solved with a strong emphasis on common sense and practical thinking (Mertens, 2014).

Each intervention was predicated on the theory that a systems approach to program implementation and delivery would achieve the desired outputs and outcomes. Systems theory is a study of systems and the interdependency of the parts of a system (Stichweh, 2011). The associated research methodology is the pragmatic trial, which is designed to test interventions in everyday clinical settings in order to maximise applicability and generalisability. The research question under investigation is “whether an intervention actually works in real life” (Patsopoulos, 2011). Evaluation in pragmatic interventions frequently uses a logic model to determine the effects of the intervention.

As the interventions became more complex the evaluation required also became more complex. Health service activities are complex interventions and the evaluation needs to consider process and mechanism, as well as context, in order to determine whether both the intervention and the implementation are effective (Campbell et al., 2007). In the final case study, a more constructivist approach was used where the intervention team recognised that there might be a number of ways to view the program outcomes. Constructivism is a theory of knowledge that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas (Fosnot & Perry, 1996).

In this case study the intervention team came from the perspective that the reorientation of the health service required a change in participants’ reasoning from providing reactive acute care, to include a proactive comprehensive approach. The

intervention used a change theory known as Kotter's change model (1995). This model describes eight stages in creating systems change which can be summarised as: creating urgency, forming a coalition, creating a vision, sharing the vision, removing obstacles, create short-term wins, build momentum and re-orientate the health system. Evaluation methods for this final case study were context-plausible. They included key informant interviews to understand the barriers and enablers to the change process, in addition to the quantitative measures in the logic model designed to determine if change had occurred. These methods enabled some understanding of how the intervention was viewed by participants to adapt it to the context. The initial evaluation plan was to include additional focus groups with community members but funding and other barriers meant this was unable to occur. This would have enabled the intervention team to understand the mechanism of the intervention better. Despite this weakness in evaluation, this case study does demonstrate the value of aligning constructivist epistemology with theory of change and mixed methods which seek to examine the intervention adaptation in a context-plausible manner.

Health systems research evaluates changes to the health system due to the intervention and includes not just changes in health outcomes, but also the importance of the processes resulting from the complex adaptive nature of health services (Lavis et al., 2004). This demonstrated the importance of matching epistemology when addressing complex problems. Finally, although critical realism was not used as an epistemological foundation for any of the case studies in this thesis, it is reasonable for me to build on the pattern unfolding from this work to propose that using a critical realism epistemology may be valuably linked to complex-adaptive systems theory and realist evaluation methodologies. Critical

realism combines a general philosophy of science with a philosophy of social science to describe an interface between the natural and social worlds (Patomäki & Wight 2000). Where the theory used in interventions is complex plausibility, it is appropriate to use realist evaluation methods to inform middle level policy and explain what works for whom in which context. This supposition is validated by recent implementation science literature (Schierhout et al., 2013). Evaluation of complex interventions requires the integration of methodological approaches, including both qualitative and quantitative methods, and recognises the importance of different paradigmatic views (Thomas, 2011; Edwards, 2012).

Drawing the findings from my thesis and the literature together has culminated in the development of a framework which describes the alignment of epistemology, theory and methodology (Table 7.1). This framework assists in understanding the linkages between epistemology, theory and evaluation. This thesis has found that the alignment of epistemology, theory and evaluation is a key attribute for ensuring accountability for outcomes due to population health interventions in the challenging context of remote Australia. The value of this alignment is potentially transferable across other population groups in other contexts, however this hypothesis cannot be confirmed by the case studies analysed in this thesis.

Table 7.1 Maturation of Conceptualisation of Population Health Interventions and Associated Evaluation Strategies

Epistemology	Theory	Research Question	Design	Analysis	Outcomes
Positivism	Causal – scientific plausibility	Efficacy – can it work in ideal circumstances	Empiricist evaluation e.g. RCT Prescriptive and standardised Logic of controls – minimise individual heterogeneity	Efficacy Mean effects Acontextual	Does it work? Proximal determinant Individual measures
Pragmatic	Systems Theory	Effectiveness -does it work under usual conditions?	Pragmatic trials Exploratory studies Intervention comparators Individual heterogeneity	Intention to treat Stratification Setting important for external generalizability Logic model Estimate of change effects	Will this intervention improve stated outcomes?
Constructivist	Adaption Theory of change	Complex system integration - how can an intervention be adapted to a context in a way that is accessible and equitable?	Examine intervention adaption within complex systems Mixed methods Systems comparators Individual and contextual heterogeneity	Analysis of linkages and transitions in logic model Contextualised – intimate understanding of program and external context Differential impacts on patients/populations	Intention to reach Equitable population health impact Actionable knowledge
Critical Realism	Adaption Systems thinking Theory of change	What works for whom in what circumstances	Exploratory, focusing on the mechanism and who benefited and who did not benefit	Efficacy considers socioeconomic context not just outcomes	Context-mechanism-outcome

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Modified from presentation by N Edwards

7.5 Key population health elements in rural and remote Australia

The implementation of population health interventions involves the translation and implementation of interventions from clinical trials and the published literature to real life situations. This process requires interventions to be adapted to take context into account in order to be effective and achieve intended outcomes (Bousquet et al., 2011). In the introduction section of this thesis I outlined the Public Health Agency of Canada population health model. This model provided a framework for considering the attributes of the cases studies in this thesis and highlighting lessons learnt in the implementation of population health interventions in the remote Australian context.

7.5.1 Test Evidence-based Assumptions in Context

The Canadian population health model highlights the need to base decisions on evidence (Glasgow et al., 2003). Recent guidelines for developing complex interventions expand on this framework and recommend that assumptions regarding how an intervention will work are made explicit and tested (Craig et al., 2013). The importance of this pre-implementation step was highlighted in Case Study 1, where testing assumptions and using modelling to determine if the intervention would achieve the desired outcomes, particularly in a cost-effective manner, avoided the potential implementation of an intervention that would have been very expensive and unlikely to achieve its goal. This groundwork is even more important in resource-poor environments dealing with large health inequities where the opportunity cost of ineffective interventions has significant potential for negative impact. In poor-resource environments there is an ethical imperative to make the most of every dollar to improve health outcomes.

Case Study 2, 3 and 4 were all examples of the implementation of long-lasting

protective interventions using new innovative strategies (the introduction of a new school vaccination, population health training for health professionals, and modification of brief intervention tools). In all these cases translating research evidence and testing the assumptions by adapting it to the local context was essential for achieving the outcomes. For example, an integral component for the effective development of the brief intervention tool was understanding the implicit assumptions around cultural safety in the local context and making this explicit in order to test this assumption before implementing the lifescrpts resources.

Adapting best practice evidence to develop comprehensive models of care to improve health outcomes was the key element for Case Study 5 and 6. The assumption that providing best practice care would improve health outcomes only held true because the context was taken into account in planning the models of care. For example, providing care in community clinics because most people did not have transport to attend the main centre up to four hours' drive away on four-wheel drive access roads assumed access was primarily related to distance rather than to acceptability of cultural safety or perceived need by community members.

Finally, in Case Study 7 the whole primary health care service for the region was reorientated to better meet the health needs of the population. The assumptions in this intervention included that poor access to primary health services by Aboriginal and Torres Strait Islander people was a result of: the very remote location; severe socioeconomic disadvantage; and marginalisation as a minority group.

This thesis illustrates that critiquing the evidence and testing assumptions in context enabled population health service providers to adapt interventions prior to implementation. This was particularly important in rural and remote Aboriginal

health due to the paucity of available evidence on effective interventions in this context, and the national roll out of standard policies and programs across the country. Not addressing local issues when rolling out programs has led to major bottlenecks for successful policy reform (Mills, 2008). Policy designed to meet the needs of the majority can have the unintended consequence of increasing the health disparity in disadvantaged populations. It is likely to be due to these populations being different from those studied in most randomised controlled studies where participants tend to have high access to care and be more socially advantaged. Testing assumptions is essential for bridging the critical disconnect between development and delivery noted by Freeman (2004).

My own lived experience, as described in the cases outlined in Chapters 3 to 6 is consistent with the principles of translating research efficacy into community effectiveness described by Glasgow et al., (2003), but emphasises more strongly the need to make assumptions explicit in the local context.

7.5.2 Maximise the Population Impact

The Canadian population health model promotes the importance of focusing on the health of the population as a whole and prioritising upstream interventions. The cases in this thesis were organised into chapters based on Frieden's pyramid of the impact of population health interventions at a population level (Frieden, 2010). Using the CHEF tool, I found that interventions that minimise the individual effort required while maximising changing the environment or system to make healthy choices easier were more effective in terms of their impact on the target populations. Frieden's (2010) pyramid recognises that interventions at the base of the pyramid addressing socioeconomic determinants of health can have a broader impact than changing the context to make individual's default health-related decisions. Changing

the context in turn can impact more people than long-lasting protective interventions and are likely to have a greater reach than single clinical interventions. Finally, at the tip of the pyramid were individual counselling and education interventions which were likely to have a smaller impact on the health of the population as a whole, reflecting the amount of individual effort required.

The case studies in this thesis demonstrate the impact or effectiveness of an intervention consistent with this pyramid effect. Using population health interventions at the base of the pyramid was more effective at bringing about improved health outcomes for remote Aboriginal and Torres Strait Islander people. The modelling which occurred in Case 1 demonstrated the potential shortcomings of a single clinical intervention requiring a lot of individual effort that needs to be repeated over time. In the next three cases (HPV immunisation, Lifescrpts modification and population health training for paramedics) longer lasting strategies were evaluated and found to be more effective for the Aboriginal and Torres Strait Islander population in remote Australia due to their continued impact across the life span and the focus on primary, secondary and tertiary prevention. The caveat to this was the necessity for ongoing funding to support the interventions. The next chapter involving Case Study 5 and 6 (ear health program and diabetes model of care) demonstrated that changing health service delivery to make participation in health care easier for the Aboriginal and Torres Strait Islander community had a significant impact on this population. The interventions changed the context of health care for Aboriginal and Torres Strait Islander people in the remote communities studied to overcome some of the barriers to providing health care in rural and remote areas. In Case Study 7, the whole health service was reorientated to meet the needs of the community by providing a more preventive, proactive health service in response to

community input.

Successful population health approaches need to embrace and combine two key prevention strategies – the ‘high-risk’ approach, which seeks to identify and protect susceptible individuals; and the population approach, which seeks to identify and address the underlying causes of incidence across the whole population (Rose, 2001). The population component of this strategy offers only a small benefit to each individual, since most of them were going to be all right anyway, at least for many years (Hunt & Emslie, 2001). This leads to the prevention paradox: “A preventive measure which brings much benefit to the population [yet] offers little to each participating individual. . . and thus there is poor motivation for the subject. . . . In mass prevention each individual has usually only a small expectation of benefit, and this small benefit can easily be outweighed by a small risk” (Rose, 2001).

The case studies in this thesis, particularly the later ones illustrate that successful population health interventions for Aboriginal and Torres Strait Islander people in remote Australia must aim to intervene at the base of Frieden’s (2010) pyramid in order to overcome the significant health status disadvantage and ingrained access barriers for this disadvantaged group of Australians. There was also an impression that combining interventions at different levels had an additive effect.

7.5.3 Address the social determinants of health using multiple-level strategies

The elimination of health disparities has emerged as a major worldwide public health objective. A 2008 publication of the World Health Organization (WHO) Commission on Social Determinants of Health (CSDH) identified persistent and widening health inequities attributable to political, social, and economic factors as avoidable and called for the translation of research evidence to reduce health

disparities as a global priority to close the gaps in a generation (Marmot, 2008). The WHO has proposed focusing on strengthening systems using systems thinking to tackle health inequities (WHO, 2007). Systems thinking involves the engagement of stakeholders and aims to inspire system-wide learning, planning, evaluation and research (De Savigny & Adam, 2009). In order to achieve this aim, systems thinking involves a detailed analysis and understanding of the linkages, relationships, interactions and behaviours of a complex adaptive system.

Effective population health interventions have multi-level programs to prevent, detect and treat disease and its risk factors in a continuous manner over a life span, as well as single one-off medical interventions for high-risk or sick individuals (Glasgow, 2008). Although a multiple strategy approach is recognised in the Canadian population health template, the case studies in this thesis emphasise more strongly this requirement in order for population health interventions to contribute effectively to the health outcomes of remote Aboriginal and Torres Strait Islander people due to the extent of the socioeconomic disadvantage experienced.

The more socioeconomically disadvantaged and marginalised a population the more important this effect is. An effective population health approach combines the principles of the Ottawa Charter to address the socioeconomic determinants of health with public health intervention across Frieden's impact pyramid. In this thesis, combining multiple-level strategies into the intervention was demonstrated to be highly effective. Cases 5 combined multiple strategies into a model of care to increase effectiveness; for example, by combining self-management in addition to clinical interventions, providing community clinics and making attendance easier for those with diabetes. In Case 7, reorientation of the way health services were provided enabled patients who were usually seen in the emergency department for

non urgent matters to be seen in a primary health clinic and receive more comprehensive care and appropriate follow up, strategies were able to be combined at multiple levels using a complex systems approach. In this case study, the contribution of alcohol restrictions at a community level had a significant impact. Viewing the health system as a complex adaptive system using systems thinking recognises the cumulative effect of multiple strategies and does not seek to separate components of the complex intervention from each other

All the cases highlighted the importance of addressing the underlying socioeconomic determinants of health in the rural and remote Australian context. Interventions at this level, like the policy changes relating to primary health care reform, access to free medical care and COAG Closing the Gap funding, were fundamental to long-term impact and sustainability. This is well described in the literature (Koh et al., 2010; Marmot & Bell, 2009) and illustrated by successful antismoking and human immunodeficiency virus prevention strategies (CDC, 2007; WHO, 2010b; WHO, 2009), but there are few studies showing the linkages and impact on outcomes, particularly in remote Aboriginal communities. This approach uses the principles of the Ottawa Charter, which highlights the essential requirements of using multiple strategies for sustainability and effectiveness over the long term and is exemplified in success of multiple approaches to reduce tobacco use (Bousquet et al., 2011). Effective population health approaches which improve health outcomes acknowledge that the social determinants of health have a greater impact on the health of a population than health care. Therefore, health cannot be achieved by the health care system alone (Lynch, 2004). This perspective can be described as an integrated approach to population health interventions which includes social and economic factors, the physical and social environment, access to

health services and social and health policies (Koh et al., 2010). Integration of services across health, housing, transport, education and employment is recognised as essential to improving health equity (Thomas, 2011). In the Canadian population health model this is described as inter-sectorial collaboration (Glasgow et al., 2003) but is not discussed further as it was outside of the scope of this thesis.

7.5.4 Integrate with existing health services

In this series of case studies, integration with other health services, principally primary health care, was an important principle of effectiveness. Integration of the intervention within existing services was particularly effective in small communities, as it contributed to efficiencies of scale. In particular, integration with existing primary health care services enabled a proactive approach to targeting individuals at high risk to be combined with community-level preventative approaches. An additional benefit found in this series of case studies was building the primary health care capacity by providing an interdisciplinary approach to health-service provision. This was particularly effective with shared population health training (Case Study 3) to ensure consistency of approach across health service personnel.

Case Study 2, which used existing primary health care services for the implementation of the new intervention (HPV vaccination), found integration with primary care to be an important aspect. In Case Study 3 and 4, increasing the capacity and scope of practice of the current health workforce and providing them with appropriate population health tools adapted for the context were effective approaches. In Case Study 5 and 6, integrating the models of care into current primary health care services, rather than developing new separate specialist services, was essential to their effectiveness. Ultimately, in Case 7, reorientation and closer integration of all the health services in the region led to strengthening and increased

sustainability of the primary health care services, which is an essential aspect of an effective population health approach.

A systematic approach was used for all of the interventions implemented, from Case 2 through to Case 7. This involved screening the whole community in the appropriate age group or life stage, based on epidemiological data, and then targeting those at high risk or with disease in a proactive manner using evidence-based practice in the manner illustrated in Figure 7.2.

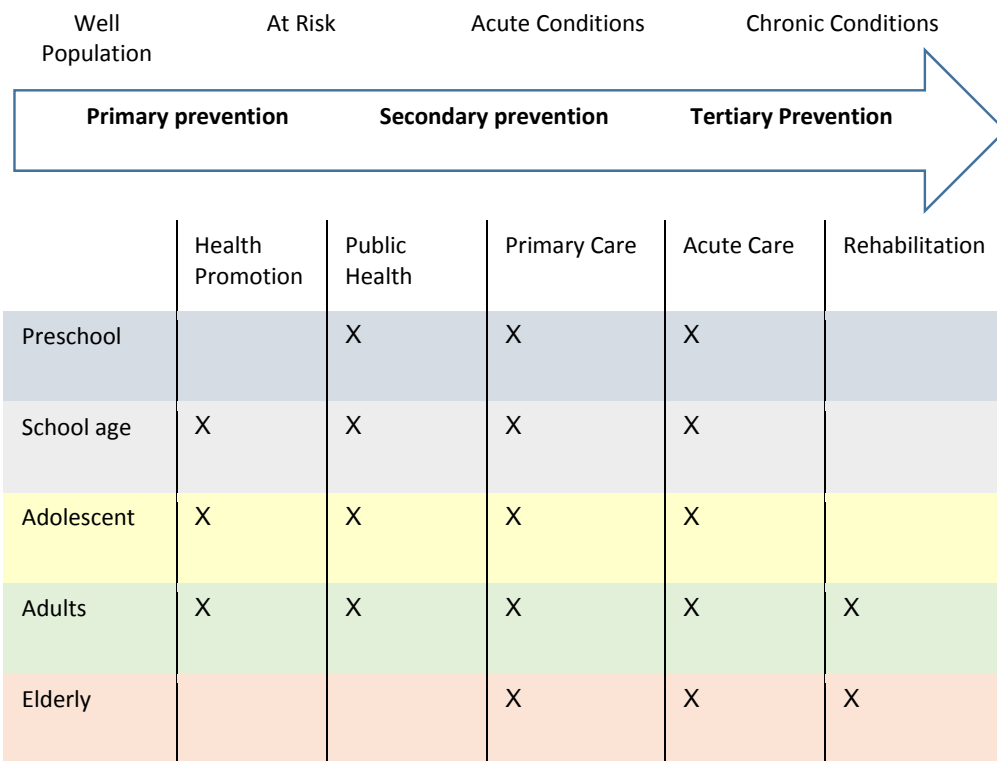


Figure 7.2 An illustration of systems approach to population health which seeks to target interventions for greatest impact on the affected population.

In Case Study 1 and 2, this more comprehensive approach to population health interventions would have likely increased their effectiveness in achieving the outcomes of these interventions. In Case Study 3 and 4, this approach was designed

to provide the health workforce with the skills and tools to intervene across the life span and increase their capacity to provide care across the prevention continuum. Case Study 5 (ear health pathway) and 6 (diabetes community partnership) were targeted to the highest risk age groups, based on epidemiological evidence, and were designed to provide a systematic approach that included best-practice primary, secondary and tertiary prevention. Best-practice interventions targeting risk factors has been shown in the literature to decrease the impact of socioeconomic differences that affect coronary heart disease mortality (Kivimäki et al., 2008) and, by extension, should apply to other chronic diseases with similar risk profiles.

As my experience in delivering health service programs increased, the importance of a systems approach across the whole health service, not just individual diseases or programs, became more apparent to me. This culminated in a whole-of-health service approach in the final case. This alignment and integration across the whole system, based around a shared vision and goals in partnership with the local community, was found in this case series to be the most effective approach with the greatest potential to be efficient and achieve the long-term goals of decreasing morbidity and mortality across the whole community.

Integration within existing services was essential for long term sustainability. This finding became most apparent by its absence in the earlier four case studies, particularly the single long-lasting protective interventions. Embedding the models of care in the reorientation of the health service fulfilled this requirement, otherwise the implementation of isolated new models of care are vulnerable to changes in structure and policy. Addressing health-systems issues at a local level is essential to successful scaling of health programs (Mills, 2008). There is growing recognition internationally of the importance of health systems in achieving outcome goals

(WHO, 2008; Edwards, 2012). In May 2009, the WHO Assembly recommended reorienting health systems globally to promote primary healthcare as the most cost-effective strategy for decreasing health inequity and improving health outcomes of populations as a whole. Recent years have seen a growing recognition of the importance of health systems in achieving the health-related Millennium Development Goals (MDG) and the constraints related to systems shortfalls that have hindered progress (Wagstaff et al., 2006).

In summary, horizontal integration and vertical integration are recognised as important components of effective population health interventions (Maeseneer et al., 2008); however the emphasis on integration with primary care needs to be stressed in remote Australia where small communities have limited health services personnel and infrastructure to effect sustainable change to the health outcomes of remote Aboriginal and Torres Strait Islanders.

7.5.5 Empower the Community

I found the principles of empowerment and self-determination at the heart of the Ottawa Charter an essential philosophical approach to the successful and sustainable implementation of the population health interventions outlined in this thesis. The importance of these principles became increasingly apparent the more complex the intervention and were identified in the CHEF tool as responsive to the community. In the first three case studies community participation was not even considered. Its absence became obvious as my understanding of its importance grew and its importance was clearly identified in Case Study 4 when health workers' and community members' experiences of the Lifescripts tools were incorporated in the development of the new tools.

In Cases 5 and 6, although responsiveness was not formally evaluated,

Aboriginal health workers were included as essential members of the team in recognition of their importance. The programs were developed and implemented in partnership with the community-controlled health services. In Case Study 7 and 8 community self-determination, ownership and participation were the underlying foundation for intervention sustainability and integral to successful implementation. Case Study 7 demonstrated that the simple application of continuous quality improvement processes were not enough to achieve large changes in health outcomes, despite large improvements in outputs/process indicators. It may be that clinical indicators of health outcomes are insufficient to demonstrate early health improvements in disadvantaged populations. More comprehensive indicators around community and patient control, social cohesion and wellbeing may be required as part of a more comprehensive realist evaluation of health services if we are going to see true health gains for disadvantaged populations like remote Aboriginal and Torres Strait Islander people.

7.6 Drawing the Findings Together

The detailed analysis and knowledge synthesis of multiple case studies revealed some consistent themes or learnings. These themes have enabled me to propose an adaption of the Canadian population health template for rural and remote Australia.

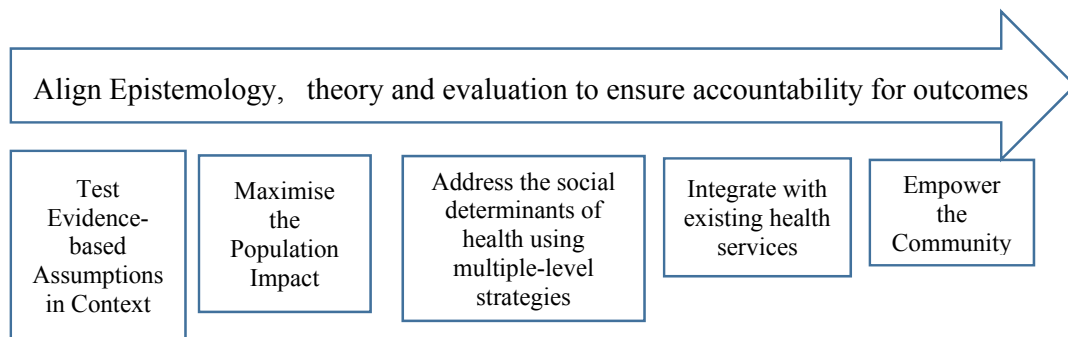


Figure 7.3 Schematic diagram of proposed effective attributes of population health

interventions in rural and remote Australia.

First, was the importance of aligning intervention epistemology, theory and evaluation methods. This ensures that the data required for effective evaluation of the intervention that will answer the research question is collected. The study underscores the importance of matching evaluation method not only to the intervention, but also to the program theory and underlying epistemology. This results in not only an appropriate evaluation, but also richer evaluation data.

Second, the CHEF tool, developed from a comprehensive primary health care service evaluation framework was used as a practical instrument to analyse and assess the impact of population health initiatives in a systematic and comprehensive fashion. It could be used with local health service providers and community members for planning interventions in order to predict effectiveness, monitor for continuous quality improvement and evaluate impact and health outcomes.

The comprehensive framework (Figure 7.4) incorporates the importance of both change theory and systems thinking when dealing with complex adaptive systems. Change Theory tells us that in order to achieve the desired outcomes we need to have service structure and service processes in place to support and achieve the outcomes. The overall value or cost-effectiveness of the intervention depends on efficient implementation structure/processes and the effectiveness of the implementation methodology in achieving the outcomes. The intervention needs to be adapted to the context using the expertise and knowledge of local health providers and community members and integrated into existing health services using systems thinking.

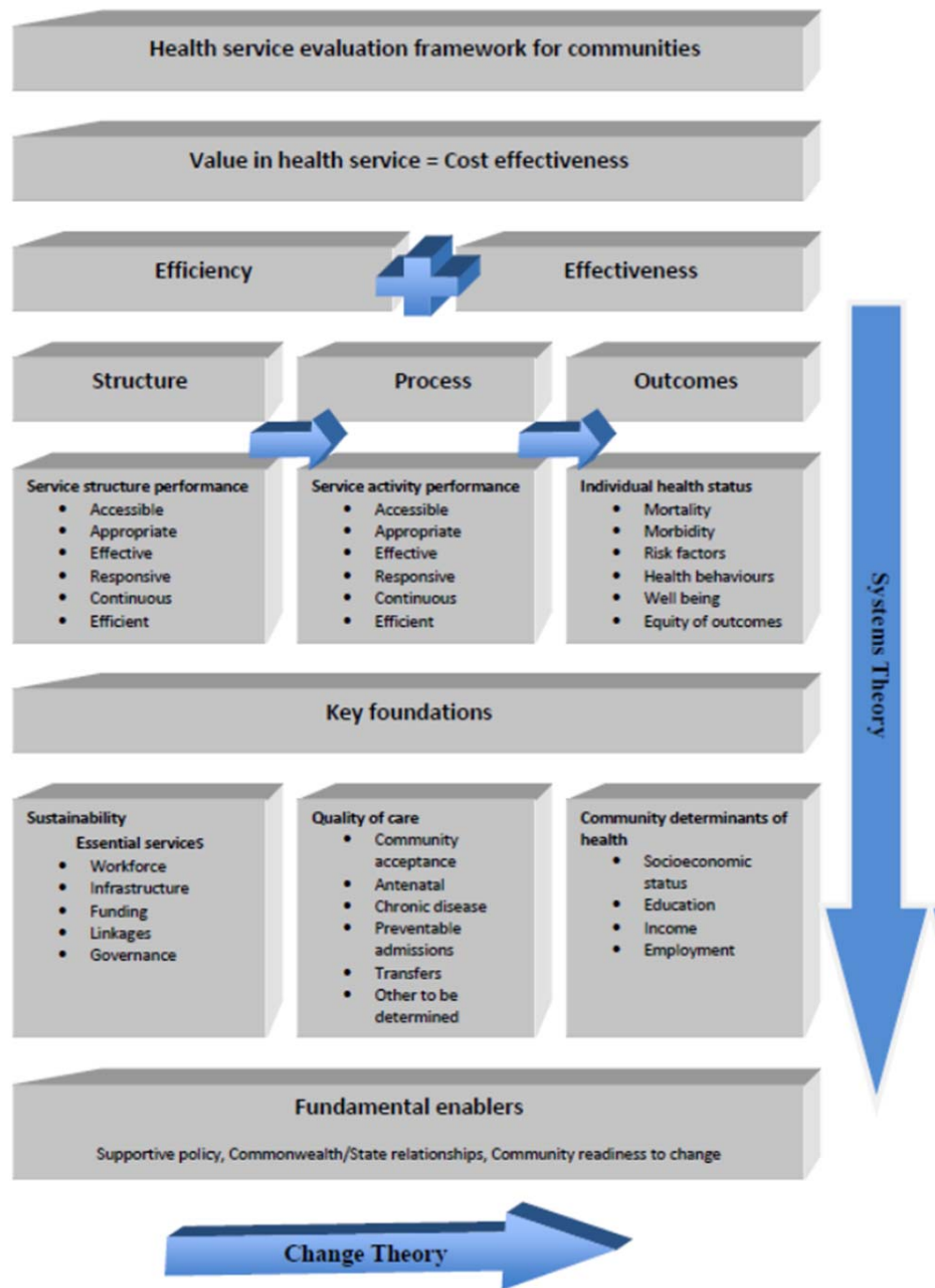


Figure 7.4 Comprehensive Health Service Evaluation Framework

The program logic model can be used to describe and identify the linkages important for implementing new interventions and achieving organisational change. Change theory can be used to identify the structural and process changes or pathway needed to achieve the desired outcomes. Systems thinking can identify external influences and assist with integrating the intervention into the health system using multiple strategies and an inter-sectorial approach. This is the concept underlying the health systems evaluation framework and enables the impact of service inputs to be associated with predetermined output indicators, providing an indication of progress towards long-term health improvements.

Complex social and health problems require complex, multi-strategy solutions. Systems Theory was first introduced by Van Bertalanffy (Drack, 2015) and introduced into the organisational setting by Katz and Khan (1966). Systems theory is an approach to organisations which likens it to an organism with interdependent parts, each with its own specific function and interrelated responsibilities. In order to achieve organisational change, it is important to understand how the system operates and the relationship the parts of the organisation have using systems thinking which encompasses systems theory. Health services have been described as complex systems but the importance of context and the relationships between stakeholders have often been ignored despite the similarity to a realist approach and the potential of complexity theory to add value by identifying the best points for intervention within self-organising, stable systems (Signal, et al., 2012).

Systems thinking suggests that for long-term sustainability and overall effectiveness all the components of the complex system are interdependent and need to be aligned to achieve the outcomes, particularly over the long-term. This means that the fundamental enablers of supportive policy, good Commonwealth/ State

relations and community readiness to change must be in place and aligned in time and purpose. Achievement of service structure performance is dependent on achieving the five key elements of sustainability (in workforce, infrastructure, funding, linkages and governance). In the same manner, achieving quality of care activity is dependent on efficient and effective aligned process activity. Achieving the desired health outcomes is dependent on the prerequisite components but, in particular, will be determined by the underlying socioeconomic determinants of health. In conclusion, my findings demonstrate the importance of research embedded in service delivery to monitor the impact of new interventions and service delivery on the health outcomes of the population.

7.7 Strengths and Limitations of the Dissertation

My journey as a public health physician reflects, to some extent, the development of population health approaches and evaluation methodologies over time. My role as a stakeholder, evaluator and research in this work is complex. The thesis contributes to future implementation and evaluation of population health interventions by analysing the attributes of interventions and their impact for rural and remote Aboriginal and Torres Strait Islander people; it also extrapolates the principles that may be of value to improving health outcomes for other vulnerable and disadvantaged populations.

The publications were not written with this thesis in mind, nor were they designed to be cases in a case study analysis. They represent empirical experiential knowledge of implementation methods and evaluation findings for a mixed audience of policymakers, health practitioners and researchers. The papers describe and discuss small-scale evaluations of small community-based health interventions in real life. The combination of evidence in the literature, practitioner knowledge and

stakeholder experience includes all of the three types of knowledge as classified by Reason (1994). The involvement of the researcher/practitioner in the intervention is seen as advantageous by some due to the greater depth of understanding of the context and mechanism (Gregory, 2000; Pawson & Tilley, 1997) by others this is seen as lacking objectivity (Crotty, 1998; Guba & Lincoln, 1989). Having a more critical or realist approach at the time of evaluating the interventions would have provided useful additional information around why and how the interventions worked and for whom. My experience in rural and remote program implementation reflect cumulative learning and experiences around the world and validate the transferability of the underlying principles to other contexts, while also highlighting the aspects critical to the local context in which the interventions occurred.

7.8 Policy and Practice Implications

This research explored aspects of population health interventions to determine what was effective in improving health outcomes for rural and remote Aboriginal and Torres Strait Islander people. This broad research question has direct applicability to current public health policy and practice in Australia in attempting to increase the understanding of ways to “Close the Gap”, particularly for rural and remote Aboriginal and Torres Strait Islander people. This thesis is an example of the potency of research embedded in service delivery and demonstrates the importance of monitoring the impact of new interventions and service delivery on the health outcomes of the population.

Government policies need to ensure that resources and infrastructure are available for new programs to collect and evaluate data and that data gathering is aligned with the epistemology of population health interventions. Linking input to outputs and outcomes through key indicators can be used as a planning, monitoring

and evaluation tool in a continuous quality improvement cycle. Measuring key indicators allows service providers and policymakers across hospital and primary care jurisdictions and more broadly than health to measure the impact of national and local policies. Resultant evidence can be used to inform policy direction and the principles translated to other health services. Thus, changing the model of care in accordance with evidence can translate into service delivery changes consistent with the goals underpinning current National Health Care Reform and Closing the Gap policies.

A more concrete implication for practice is that the CHEF tool has been demonstrated to be a practical instrument to assist with the analysis of the impact and effectiveness of an intervention in a systematic and comprehensive manner. The CHEF tool enabled judgements to be made transparently and conclusions to be reached across the case studies. Importantly the use of the CHEF tool identified common themes across the case studies that had been described in theory and in other contexts suggesting that the tool may be useful addition to the evaluation literature.

7.9 Conclusions

This thesis by published work investigates a population health approach to improving health outcomes of Aboriginal and Torres Strait Islander people in rural and remote Australia. In Chapter 1 I described the current poor health status for Aboriginal and Torres Strait Islanders living in remote Australia and placed the thesis in the context of the literature. Chapter 2 provided an outline of my own epistemology, the case study method and the program logic model used to analyse a series of case studies. The CHEF tool used change theory to describe and identify relationships, and enabled the impact of service inputs to be associated with

predetermined output indicators, providing an indication of progress towards long-term health improvements.

Chapters 3 to 6 outlined each of the case studies described in this thesis which were empirical “real world” implementations of programs from my experience delivering public health interventions and primary health care services. These case studies were arranged to progress from: a single clinical intervention; to long-lasting preventative interventions; to single illness models of care aimed at changing the context for Aboriginal and Torres Strait Islanders; and finally to health service re-orientation.

This thesis built on the Canadian Population Health template to identify key elements essential to an effective approach to population health interventions in remote Australia. These included: testing intervention assumptions; considering the population impact of interventions using Frieden’s pyramid; using multiple-level strategies; integration of population health and primary care services, and community empowerment. Importantly, as with all complex-adaptive systems, each individual component of this model cannot be considered in isolation. The critical role of translating research evidence into population health outcomes at the local level requires multiple strategies in complex systems to address the complex social and health problems faced by disadvantaged populations. This complexity demonstrated the need for a systematic approach to evaluation. Specifically I developed a practical framework to assist with aligning intervention epistemology, theory and evaluation methods in the rural and remote context. Finally I drew these findings together to propose a comprehensive framework demonstrating the importance of both change theory and systems thinking.

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Appendices