Enough for rations and a little bit extra

Challenges of nutrition improvement in an Aboriginal community in North-East Arnhem Land

by

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This painting was presented to the Co-operative Research Centre for Aboriginal Health in 2002 by Yalu’Marnnggithinyaraw. It represents both Yolngu and Balanda concepts of health and ways of knowing. In seeking an understanding of factors influencing nutrition and nutrition improvement for Yolngu, it is imperative that Aboriginal people’s knowledge, beliefs and concerns about food and diet are taken into account.
Dedicated to Steven Djati Yunupingu and his family

And a special tribute to Yalu’Marnggithinyaraw
Ralmanapanmirr!
Declaration

I hereby declare that the work herein, now submitted as a thesis for the degree of Doctor of Philosophy of the Charles Darwin University, is the result of my own investigations, and all references to ideas and work of other researchers have been specifically acknowledged. I hereby certify that the work embodied in this thesis has not already been accepted in substance for any degree, and is not being currently submitted in candidature for any other degree.

This thesis is an outcome of the input, ideas, perceptions and concerns of many people. Conceptualising this input into a thesis is substantially my own work and was performed under the guidance of my supervisor. I hereby specifically acknowledge the following contributions of others. My PhD study was nested in a community-based intervention study with which Professor Kerin O’Dea was the leading chief investigator. Professor Kerin O’Dea and co-investigators, Dr Mark Daniel and Dr Kevin Rowley, played the lead role in the conceptualisation and design of the community-based intervention study. As a team member of the community-based intervention study, I played a lead role in the conceptualisation, study design, data collection and analyses of the research for this thesis. I have written all thesis chapters. Elaine Maypilama, Maria Scarlett and Dorothy Yunggirrnga Bukulatjpi contributed to the study methods, assisted with data collection for various study components, assisted with the validation of study findings, and facilitated the engagement with community members and organisations. Dr Wendy Gunthorpe and Dr Kate Senior had input into the study design for the school-based study.

Julie Kay Brimblecombe
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Abstract

Type 2 diabetes, cardiovascular and renal disease contribute significantly to the lower life expectancy and disproportionately high rates of morbidity of Indigenous Australians\(^1\). Diet plays a key role in protecting against these conditions. The people of Galiwin’ku, an Aboriginal community in North-East Arnhem Land, are striving to improve their health and well-being by addressing the nutritional quality of the food supply and encouraging healthy eating practices.

Through a series of studies, this thesis investigates the problem of poor nutrition and the factors influencing eating behaviour in Galiwin’ku community. Guided by the social-ecological perspective of the PRECEDE-PROCEED model, this thesis comprises four assessment phases: 1) an epidemiological assessment (screening study) of the extent of type 2 diabetes and related conditions; 2) a behavioural and environmental assessment of dietary intake, food affordability and availability (quantitative assessment of community level food supply); 3) an educational and ecological assessment of historical and contemporary factors impacting on diet and nutrition improvement (archival, observational and structured and unstructured interview methods); and 4) an administration and policy assessment of facilitators and barriers to improving the nutritional quality of food available through the community store (case study using observational and structured and unstructured interview methods).

The epidemiological assessment identified excess weight gain among young people as a modifiable risk factor to prevent type 2 diabetes. The behavioural and environmental assessment identified access to healthy food and poverty as key determinants of food choice. The educational and ecological assessment suggests that nutrition improvement efforts need to consider broader-based determinants such as employment, housing, the availability and cost of food, and illicit substance use. The administration and policy assessment found the community store a critical intervention point for increasing the availability of healthy food choices. To achieve this, a framework is proposed based on a collaborative “whole-of-store” approach that integrates feed-back into a cyclic improvement model.
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Publications

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Introduction and literature review
Chapter 1. Introduction and scope of thesis

Nutrition and nutrition-related disease among Indigenous Australians

Relative to the rest of the Australian population, Aboriginal Australians experience very high rates of potentially preventable chronic diseases, notably type 2 diabetes, cardiovascular disease (CVD), and renal failure\textsuperscript{1}. The major causes of death, illness and disability in the Australian Indigenous population that have diet as a risk factor include these three diseases\textsuperscript{1}. Available epidemiological evidence among the Australian Indigenous population suggests that the overall prevalence of diabetes among adults is between 10-30 percent, and at least 2-4 times that of the non-Indigenous population\textsuperscript{2}. The proximal risk factors associated with type 2 diabetes and associated conditions, such as obesity, physical inactivity and poor quality diet, are becoming increasingly prevalent among Aboriginal populations living in remote communities\textsuperscript{3-7}. Poor quality diet reported among Aboriginal Australians is characterised by a diet comprising excess refined carbohydrate, saturated fat and sodium, and low levels of fruit and vegetable consumption\textsuperscript{8}.

Type 2 diabetes and other preventable chronic diseases among Indigenous Australians contribute significantly to the much lower life expectancy relative to the overall Australian population\textsuperscript{1}. In 1995-1997, CVD, injury, neoplasms, respiratory disease and type 2 diabetes together, accounted for about 3 out of every 4 deaths identified as Indigenous\textsuperscript{1}. Although these causes were responsible for the majority of deaths in Australia as a whole, they occurred at greater rates among the Indigenous population and at a much earlier age of onset\textsuperscript{9}. Conditions such as type 2 diabetes have a much earlier age of onset among Aboriginal populations\textsuperscript{10,11}, and a higher rate of disease progression\textsuperscript{12}. There is no available evidence of diabetes and related conditions, so prevalent among Aboriginal people today, existing prior to colonization\textsuperscript{13-15}. Aboriginal Australians were traditionally lean and did not appear to gain weight with age\textsuperscript{15}.

Poor diet throughout the lifespan contributes to chronic diseases such as diabetes, and cardiovascular disease\textsuperscript{16}. Undernutrition, particularly when occurring in intra-
uterine life and the first years of life is suspected of contributing to an increased risk of abdominal obesity, diabetes, hypertension, cardiovascular disease, and renal disease in later life\textsuperscript{17,18}. This is a particular concern for the Australian Aboriginal population as Aboriginal women are twice as likely to give birth to low birth-weight babies than other Australian women\textsuperscript{19}. While preventable chronic disease is increasing among the Australian Aboriginal population, it is occurring concomitantly with unacceptable levels of undernutrition in young children. In the NT wasting rates of 4-8\% and stunting rates of 15-17\% have been reported\textsuperscript{20}.

Diet can play a key role in protecting against these conditions\textsuperscript{21}. In particular, the evidence supporting the importance of high intakes of fruit and vegetables in protecting against degenerative diseases is moderate to strong\textsuperscript{22-24}. A comprehensive review in 1999 of studies exploring the relationship between fruit and vegetable consumption and disease concluded that there is sufficient evidence to recommend an increase in the consumption of fruits and vegetables by the Australian population beyond that of current levels\textsuperscript{22}. Baghurst et al\textsuperscript{22}, in line with the UK expert Committee on Medical Aspects of Food and Nutrition Policy\textsuperscript{23}, concluded that the evidence for a protective effect on disease risk from increasing fruits and vegetables is moderately strong for cardiovascular disease and some cancers (colo-rectal and stomach) but weak and inconsistent for other cancers\textsuperscript{22}. For example, a more recent prospective study reported a 63\% lower incidence of lung cancer among never-smokers who consumed a diet high in a variety of carotenoids derived from fruits and vegetables, compared to those with a low intake\textsuperscript{25}.

A prospective observational study among approximately 40,000 female health professionals reported a trend for lowered risk of cardiovascular disease, especially myocardial infarction with higher fruit and vegetable intake\textsuperscript{26}. Compared to the traditionally recommended low fat/low saturated fat diet, additional modification of diet through specific promotion of fruit and vegetables, wholegrain cereals and changing the type of fat through eating more fish and less red meat, has been found to reduce mortality following myocardial infarction by more than 70\%\textsuperscript{27,28}.
Evidence is now emerging on the effectiveness of improved diet in relation to type 2 diabetes. Specifically, a randomised controlled trial showed that improved diet and/or modest physical activity led to a 31-46% reduction in risk of developing diabetes\textsuperscript{29}. More recently several randomised controlled trials have shown that an improvement in the overall quality of the diet (that is frequent consumption of wholegrain products, vegetables, fruit, reduced fat milk, lean meats, soft margarines and olive oil), combined with modest physical activity (at least 30 minutes per day) and a reduction in weight of around 3kg among those already overweight, will halve the progression of impaired glucose tolerance to diabetes over 2-6 years\textsuperscript{30-33}.

A decade ago, the cost of health care services consumed in treating diet-related diseases and indirect costs as a result of lost earnings and premature death was estimated over $2.25 billion\textsuperscript{34}, highlighting the impost of poor quality diet on society and the economy\textsuperscript{34}. The indirect cost on Aboriginal society is particularly high considering the disproportionate prevalence of nutrition-related disease among Aboriginal people. The Aboriginal people I have come to know over the period of this study are burdened with the constant grieving for family members and care of the sick and unwell, largely due to early onset, but potentially preventable chronic disease.

It has been postulated that traditionally, Aboriginal people procured a high quality diet with no evidence of nutritional deficiencies\textsuperscript{13}. Among the Anbarra people of Arnhem Land, Meehan\textsuperscript{35} observed that the preferred diet was ample quantities from each of the (traditionally constructed) food categories. Meehan reported that Aboriginal people had well defined ideas about what constituted a balanced diet. The following excerpt illustrates the concept of food balance from a Yolngu perspective:

\begin{quote}
Yolngu from both the freshwater country and the saltwater country have the full balance of carbohydrate and meat food through their individual skills and resources and through sharing……sweet starchy foods are opposites. Matha’yal is meat which needs to be balanced off with murnyang’ which is carbohydrate\textsuperscript{36}.
\end{quote}
Nutritional problems among Aboriginal Australians are very complex and are not due solely to lack of knowledge about contemporary foods. Socio-economic, geographical, environmental, cultural and social factors may all influence food availability, food consumption, and therefore nutritional health. In addition the clustering of poor nutrition with smoking, physical inactivity and socio-economic factors presents a complex array of nutrition-related issues.\(^{37}\)

**Social determinants of health in the Indigenous Australian context**

*Poverty, social inequality and disempowerment*

Both poverty and social inequality are considered to underlie the health differential between the Aboriginal and non-Aboriginal Australian populations.\(^{38}\) It is thought that further contributing to disadvantage is the sense of powerlessness among Aboriginal people deeply enforced by dominant non-Aboriginal society in the early days of colonization.\(^{38}\) This powerlessness relates to the dispossession of the ancestral lands of Aboriginal people with European settlement and the pervasiveness of the dominant culture in acting to undermine traditional social and governance structures.\(^{38}\) Regaining control over land, governance structures and community level decision-making are high priorities on the Aboriginal political agenda. Expression to achieve greater control over circumstances is evident in the everyday lives of people and within community groups.\(^{38}\)

The effects of poverty, social inequality and disempowerment are further complicated by a rapid process of social and cultural change that is challenging long held community values and authority.\(^{38}\) Low levels of employment, income and education further exacerbate the cycle of poor health for Aboriginal Australians.

*Employment, income and education*

The Australian Indigenous population represents only 2.4% of the total Australian population.\(^{39}\) The NT Indigenous population is a young population with a median age of 21.8 years compared to 36.1 years for the non-Indigenous population.\(^{40}\) In the NT, 46.3% of the Indigenous population is less than 20 years of age. This young
population presents different nutrition and health issues for Indigenous people\textsuperscript{40}. Low levels of formal education contribute to the low levels of employment and health experienced by Indigenous Australians. In 2002, among Indigenous Australians living in remote areas of the NT, 4.9\% had completed secondary school\textsuperscript{41}.

There are limited employment opportunities for Indigenous people on remote communities. The Australian government developed the Community Development and Employment Program (CDEP) work-for-the-dole scheme to replace unemployment benefits and provide opportunities for people to engage in the formal workforce. In 2002, 45.1\% of Indigenous people 15 years of age and over in the NT had employment, including 27.5\% who worked on the CDEP program\textsuperscript{41}.

The low level of engagement in the workforce is reflected in the generally low incomes. In 2002 in the NT, 49.8\% of the 15 years and over Indigenous population were in the lowest quintile for equivalised gross household income and half of the Indigenous NT population aged 15 years and over received government pensions and allowances as their main source of income\textsuperscript{41}. In 2002 the real gross weekly equivalised household income for Indigenous Australians was $394, 59\% of that of non-Indigenous households\textsuperscript{42}.

Income is vital to being able to access adequate food. In 2002, 77.4\% of Indigenous people in the NT aged 15 years and over reported financial stress. This proportion was significantly higher for Indigenous people in remote areas than in non-remote areas (84.2\% and 43.7\% respectively)\textsuperscript{41}.

**National strategies and initiatives to combat nutrition-related problems**

Recognition that primary prevention at the population level provides greater benefits in the long term, a population-centred approach has driven recent nutrition policy initiatives. The framework for action for better nutrition for all Australians is the Eat Well Australia (EWA) strategic framework\textsuperscript{34}. This framework was developed by the Strategic Inter-Governmental Nutrition Alliance (SIGNAL). SIGNAL is the nutrition arm of the National Public Health Partnership which is a partnership
between the Australian Government and the states and territories, to plan and coordinate national public health efforts. The broad aims of EWA are listed in Table 1.1. A complementary document to EWA is the National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan (NATSINSAP)\(^3\). The seven action areas outlined in NATSINSAP are:

- Food supply in remote and rural communities
- Food security and socio-economic status
- Family focused nutrition promotion: resourcing programs, disseminating and communicating food practice
- Nutrition issues in urban areas
- The environment and household infrastructure
- Aboriginal and Torres Strait Islander nutrition workforce
- National food and nutrition information systems

| Table 1.1 Aims and priority areas of the Eat Well Australia strategic framework |
|-------------------------------------------------|-------------------------------------------------|
| Broad aims                                      | Priority areas                                 |
| Support health gains                            | Preventing overweight and obesity              |
| Improve the capacity of Australians to choose a healthy diet in line with the Australian Guide to Healthy Eating\(^1\) and NHMRC dietary guidelines | Increasing the consumption of vegetables and fruit |
| Support improved nutrition at all points in the food system in partnership with stakeholders in relevant sectors | Promoting optimal nutrition for women, infants and children |
| Provide targeted resources to those groups more vulnerable to poor nutrition; and | Improving nutrition for vulnerable groups, including rural and isolated populations, low income groups and Indigenous Australians |
| Monitor the food and nutrition system and seek opportunities for improvement |                                                   |

\(^1\) The Australian Guide to Healthy Eating\(^4\) provides information about the amounts and kinds of foods that are needed each day to get enough nutrients essential for good health and wellbeing.
Northern Territory strategies and initiatives to combat nutrition-related problems

The NT Preventable Chronic Disease Strategy\(^{44}\) was developed in 1998 as the major government framework for the prevention and control of chronic disease in the NT. Drawing on local, national and international literature, a “best practice” approach was developed that encompasses a range of possible preventive and management interventions for chronic disease across the life course. Dietary and anti-smoking interventions are emphasised. The Northern Territory Food and Nutrition Policy 2001-2006\(^{45}\) specifically addresses the poor nutritional health status of Aboriginal people. Three of the nine priority areas for action stated within the NT Food and Nutrition Policy, relate directly to improving the food supply in remote communities. The NT Food and Nutrition Policy is the responsibility of the NT Department of Health and Community Services and is largely implemented through the deployment of public health dietitians.

Approaches for Remote Australia

In the NT approximately 28% of the total population is Indigenous and approximately 71% of this group live in geographical locations considered very remote\(^{46}\). These locations exist as centralised townships, commonly referred to as communities and homelands. Remote communities vary in size from an extended family group to over 2500 people. Very remote areas are defined by geographic distance which imposes the highest restriction upon accessibility to the widest range of goods and services and opportunities for social interaction\(^{47,48}\). Access to remote areas is often affected by weather conditions and poorly developed infrastructure. The remoteness of communities is an important factor when considering factors influencing nutrition.

During the period of this research (2001-2005), there has been an increasing interest in remote community stores and take-away food outlets on the part of both government and non-government organisations. A non-government organisation, the Fred Hollows Foundation, has supported an Indigenous health program in the East Katherine region of the Northern Territory since 2000, part of which involves a
community stores management program. The Indigenous communities of the Anangu Pitjantjatjara Lands in South Australia over a three year consultation period (1998-2001) developed the “Mai Wiru stores policy and associated regulations” for its twenty or so member communities, and advocated intensely for a more equitable food supply for remote Indigenous communities.

The North Australian Nutrition Group (NANG), under the auspices of the north Australia Health Ministers, released a report in October 2003 stating four recommendations to improve the availability and affordability of nutritious food in remote stores. One of these recommendations was to implement a north Australia Food Supply project. This culminated in a tripartite agreement between the Health Ministers of Queensland, Western Australia and the Northern Territory to fund a three year (2004-2007) program for Remote Indigenous Stores and Take-away food outlets (RIST). There is evidence of further commitment of the Australian government to support remote community stores through the recent Indigenous Business Australia Outback stores initiative. It has been in the context of these developments in relation to remote community stores that this research was conducted.

**Progress of interventions to improve nutrition of Aboriginal Australians living in remote Australia**

The most comprehensive study of the dietary quality available to Aboriginal Australians living on centralised communities in remote Australia was conducted by Lee et al in 1989. Lee et al demonstrated that nutrition improvement could be achieved through intervention at the level of the store with related improvements in dietary markers and nutrition-related chronic conditions. Several later studies and reports of community-based interventions in specific locales, have similarly demonstrated improvements in the nutritional quality of the food supply as a result of intervention. These interventions have largely focused on increasing the availability of healthy foods in the community store and concomitant community-wide education.
Few nutrition programs have been well evaluated and include process evaluation\textsuperscript{56,57}, resulting in a lack of available information relating to the process of change and the factors affecting implementation. One important reason for such information paucity is that although remote community stores are considered a focal point for dietary intervention, there is no systematic data collection mechanism available to monitor improvements in the dietary quality of remote community stores. Furthermore with the few intervention studies that have been conducted, attention has been focused on demonstrating the impact of interventions on dietary quality rather than on understanding the “how”, or the process of change. This has resulted in piecemeal approaches to improving the general nutritional status of Aboriginal communities\textsuperscript{58} and limited available knowledge to guide program implementation.

Whilst there is ample literature indicating poor diet among Aboriginal people in remote communities of the NT, much of this literature is now dated. There is little understanding of the factors influencing nutrition beyond a general understanding of the basis of poor nutrition among Aboriginal people in remote communities. Many generalizations and assumptions instead are commonly made about diet and nutrition of Aboriginal Australians. Research which has been carried out has tended to focus on the institutions involved in providing food and on nutrition education. There has been far less focus on the exploration of factors influencing nutrition from the perspective of Aboriginal people.

Australia has recently intensified its efforts to support remote community stores to improve the quality, availability and affordability of the food supply. Insight into how these factors influence the nutrition of Aboriginal people and other possible influences is required to inform the development of appropriate strategies to combat poor nutrition. Moreover, considering the increased attention on remote community stores as a primary strategy for nutrition improvement for Aboriginal people living on remote communities, there is an urgent need to understand the factors influencing nutrition improvement at the store level in remote communities.
1.1. Aims of the research and research questions

The aim of this research is to explore the complex array of physical and social factors that enable or hinder Aboriginal people living in remote communities in the Top End of the NT achieving adequate nutrition. The focus of this research is on one community in North East Arnhem Land.

**Primary research question**

What are the key historical, social, cultural, economic and environmental factors which underlie the current diet and eating behaviour of Aboriginal people living in a remote community in the NT and challenge nutrition improvement?

**Secondary research questions**

What is the magnitude of type 2 diabetes and related conditions including poor diet, among the study population?

To what extent have past approaches to nutrition improvement impacted on the behaviour of Aboriginal people in relation to their food choices and eating patterns in the study community?

From the perspective of Aboriginal people, what factors influence eating behaviour and nutrition improvement?

How do store practices influence the nutritional quality of the food supply?

What approaches may be appropriate to support nutrition improvement in remote community stores?

Eating behaviour is used as a broad term that includes food preferences, the provision and consumption of food. It refers to behaviour that relates to food choice and eating patterns. The term dietary quality refers to the quality of the diet in relation to its nutritional composition and adequacy. The term food choice is also
used broadly in reference to the foods that people select to eat. Environmental factors are those determinants outside the individual that influence eating behaviour, food choice and dietary quality.

1.2. Study design

This research uses a mixed methods study design\textsuperscript{59}. The design is based on systems theory and social-ecological theory\textsuperscript{60-63} and is informed by participatory research\textsuperscript{64} and Indigenous ethical principles\textsuperscript{65}. A social-ecological perspective, focuses on understanding individual behaviour in a broader social and environmental context\textsuperscript{60;61}. Systems theory assumes that every living and non-living part of the environment is inter-related and that meaningful understandings thereby come from building up whole pictures of the system rather than reducing a system to its component parts\textsuperscript{66}. While a socio-ecological perspective considers the interaction of multiple levels of influence on behaviour, a systems model relates the system components to a larger whole\textsuperscript{60}.

These perspectives which guide a holistic and comprehensive approach to inquiry and understanding are appropriate to the research context where Yolngu epistemology relates everything in the environment to the individual in the present, past and future. Yolngu are connected physically, emotionally and spiritually with the environment. Within a systems/socio-ecological perspective the present research has gathered data from multiple perspectives and settings using mixed methods and has assembled them as a whole, showing their relatedness and interdependence to present a comprehensive and holistic picture of factors influencing eating behaviour and nutrition improvement. The research comprises multiple study components to address the complexity of the primary research question. Each component of the research contributes to addressing the primary research question from a different perspective. The different methods used for each study component are described early in each chapter. Mixed methods were used for four reasons: 1) to capture the complexity of the research question\textsuperscript{67}; 2) to provide direction of subsequent data
collection and inquiry\textsuperscript{68}; 3) for the purposes of triangulation\textsuperscript{68}; and, 4) to respond and be sensitive to Aboriginal ways of sharing knowledge and views. Considering the multiple levels of influence on behaviour, the complexity of the research question, and the differing values, beliefs and norms between the Aboriginal people in the study community and the researcher, a mixed method approach was considered the best way of answering the research question and gaining insights and understandings that might have been missed if only a single method was used\textsuperscript{59}.

The planning and conduct of these study components was informed by the PRECEDE-PROCEED health promotion planning model\textsuperscript{69}. The PRECEDE-PROCEED model as shown in Figure 1.1 provides a framework for assessing the multiple factors influencing nutrition and nutrition improvement. The PRECEDE component of the framework is based on five assessment phases. The assessment phases of the framework are guided by the different study components of this research.

![The PRECEDE-PROCEED model for health promotion planning and evaluation](image)

* Yolngu denotes the Aboriginal people of North East Arnhem Land as a distinct Aboriginal cultural group
Primary research question: What are the key historical, social, cultural, economic and environmental factors which underlie the current diet and eating behaviour of Aboriginal people living in a remote community in the NT and challenge nutrition improvement?
**Social assessment**

This phase of the assessment of nutrition and nutrition improvement had occurred prior to the commencement of the present research. The study community had raised concern about the impact of type 2 diabetes and other preventable chronic diseases on individuals and families, and were seeking technical support and resources to facilitate preventative action. The prevention and management of type 2 diabetes had been situated by community people within a Yolngu knowledge framework and linked with the songs, dances, designs and other attributes of three traditional foods: the cycad plant, the honey from the native bee, and the mudcrab. Improved nutrition was considered pertinent to better health and prevention of type 2 diabetes and related conditions.

**Study components**

*Phase 1: Epidemiological assessment*

In partnership with a community Indigenous organisation, Yalu’ Marnggithinyaraw, the first phase of the research involved an epidemiological assessment of nutrition-related disease with the aim of determining the prevalence of type 2 diabetes and the patterning of overweight and obesity, and dietary behaviour in the study community. This quantitative assessment provided the direction for subsequent research phases. It sought to answer the research question: What is the magnitude of type 2 diabetes and related conditions including poor diet among the study population?

*Phase 2: Behavioural and environmental assessment*

The second phase of the research aimed to identify specific behavioural and environmental factors that could be linked to the nutrition-related conditions examined in phase 1. The nutritional quality of food provided through the community food-outlets was assessed to determine the adequacy of the community level diet and to identify dietary areas of concern. Environmental factors influencing nutrition, specifically food availability and affordability were examined. Subsequent
research phases provided data to strengthen and develop the findings of phase 1 and phase 2.

**Phase 3: Educational and ecological assessment**

Qualitative methods were used to further explore factors influencing eating behaviour and nutrition improvement. Phase three aimed to assess the factors influencing nutrition from the views of Aboriginal people living in the study community, and non-Aboriginal people who currently or previously had a close association with the study community. The PRECEDE-PROCEED model, groups factors influencing behaviour according to predisposing, enabling and reinforcing factors. This model together with systems/socio-ecological theory provided a framework to consider factors influencing eating behaviour. Predisposing factors include a person’s or population’s knowledge, attitudes, beliefs, values and perceptions that facilitate or hinder motivation for change. Enabling factors are the skills, resources, or barriers than can help or hinder behavioural and environmental change. Reinforcing factors include the factors that encourage or discourage continuation of a desired behaviour.

This phase involved three study components. The first involved an historical analysis of the food supply and nutrition and diet using qualitative data. Archival documents and interviews were used to examine past approaches to nutrition improvement and their influence on present dietary behaviour. The second study used qualitative methods to explore factors influencing nutrition and eating behaviour from the perspective of Aboriginal people. Key themes that emerged from this study concerned young people. As phase 1 also identified young people as an important target group to prevent further development of type 2 diabetes, a third study was conducted that used mixed methods to explore young people’s perspectives of food and nutrition. This phase sought to answer the research questions: To what extent have past approaches to nutrition improvement impacted on the behaviour of Aboriginal people in relation to their food choices and eating patterns in the study community? And; from the perspective of Aboriginal people, what factors influence eating behaviour and nutrition improvement?
Phase 4: Administrative and policy assessment

The administrative assessment of the PRECEDE-PROCEED model entails an analysis of the resources required, the resources available, and the barriers to implementation of a program for nutrition improvement. The policy assessment then asks what political, regulatory and organisational supports and barriers can be changed to facilitate nutrition improvement. Recognising the store as a focal point for nutrition intervention, phase four assessed the capability and resources of the store to develop, implement and sustain improvements in the nutritional quality of the food supply. The facilitators and barriers to implementing and supporting nutrition improvement at the store level were explored throughout the research period using qualitative methods. This phase of the research sought to answer the research questions: How do store practices influence the nutritional quality of the food supply? And; what approaches may be appropriate to support nutrition improvement in remote community stores?

The information collected from the four phases was collected and translated with key stakeholders in the study community to inform the development, implementation and evaluation of community interventions for the primary and secondary prevention of type 2 diabetes and CVD. Information was also continually fed back into the Northern Territory Department of Health and Community Services food-related development and implementation processes.

1.3. Outline of thesis

There are six sections to this thesis in 11 chapters. The chapters are inter-related. The epidemiological and behavioural and environmental assessments presented in chapters four and five, provide the foundation for identifying health issues in the community, and behaviours that are modifiable and changeable through intervention. Chapters 6 to 8 provide a different lens through which to view factors influencing nutrition, eating behaviour, food choice and dietary quality. Chapters 9 and 10 propose a way forward for nutrition improvement in relation to the community store.
Section one: Introduction and literature review

Chapter 2 provides an overview of available perspectives on Aboriginal nutrition and factors influencing nutrition and nutrition improvement. Physical and social factors hindering and enabling good nutrition among Aboriginal Australians in remote communities of the NT are reviewed at both the micro- and macro- levels. This chapter also reviews international and local community-wide approaches to the prevention of type 2 diabetes and CVD and identifies elements of these approaches considered to be important for facilitating and sustaining social change for improved health.

Section two: Research context and framework for research approach

Chapter 3 provides the research context and a framework for the research approach. An introduction to the study community is provided. This chapter provides the rationale for the research approach and data collection methods, based on systems and social-ecological theory, participatory research and Indigenous values and principles.

Section three: Epidemiological, behavioural and environmental assessment: What is the problem?

Chapter four aims to answer the research question: What is the magnitude of type 2 diabetes and related conditions? Through an empirical cross-sectional study, the prevalence of diabetes and patterning of overweight and obesity are determined and related dietary behaviours explored.

Chapter five aims to answer two main questions: Are there dietary inadequacies in the purchased diet for Aboriginal people living in the study community?; and, to what extent do the two key environmental factors identified in the literature, cost and availability, influence nutrition? To answer these questions, I quantitatively describe and assess the dietary quality of the community food supply using a modified version of the store-turnover method. A comparison of the cost of the actual community level diet and recommended diet is presented.
**Section four: Educational and ecological assessment**

Chapter six examines the extent by which past approaches to nutrition improvement have influenced current nutrition behaviour. The context and influence of government policy on the food supply available to Aboriginal people in the NT since colonization is examined, with a focus on the study community. Primary source data including several sources of archival data and in-depth interviews collected from older Aboriginal people and non-Aboriginal people connected with the study community during the mission era are used.

Chapter seven explores the views of Aboriginal people living in the study community on the factors influencing eating behaviour and nutrition improvement. Predisposing, enabling and reinforcing factors to nutrition improvement are explored at the micro-, meso- and macro levels. Qualitative methods of participant observation, in-depth interviews and focus groups are used.

Chapter eight explores the views of young Aboriginal people on factors influencing nutrition and eating behaviour through a school-based study. Young people’s food preferences and perceptions of food in relation to health and disease are explored. Mixed methods including school-based focus groups and a structured questionnaire are used.

**Section five: Administrative and policy assessment**

Chapter nine explores the question: What supporting structures may be appropriate to facilitate and help maintain nutrition improvement through the store food supply? Through a case study of the community store this chapter examines the organisational barriers and supports that influence improvements in the nutritional quality of the community store food supply. A framework to support and maintain nutrition improvement is proposed. Chapter ten aims to answer the question: Can a simple performance monitoring tool detect changes in the nutritional quality of the store food supply over time? This chapter proposes a tool to support nutrition improvement in remote Aboriginal communities.
Section Six: Conclusions

Chapter eleven provides concluding remarks for the whole study. It summarises the principal research findings, identifies strengths and weaknesses of the study, discusses policy and practical implications, and makes suggestions for future research.
Chapter 2. Views on Aboriginal nutrition, and factors influencing nutrition and community change for nutrition improvement: a review of the literature

The literature reviewed relates to two sets of literature. The first set of literature relates to factors influencing the nutrition of Aboriginal Australians living in remote Australia; the second set of literature reviews international, national and territory approaches to community-based interventions to prevent chronic disease that can be shown to be appropriate to the study context.

2.1. Determinants of type 2 diabetes in Aboriginal Australians: A shift in focus from lifestyle to environmental conditions

Numerous diabetes prevalence studies have been conducted among different Aboriginal populations in Australia and the Northern Territory since the 1970s. In the early years of type 2 diabetes related research concerning Aboriginal Australians, the general consensus was that the supposed feast-famine pattern of traditional food procurement led to a metabolic adaptation of Aboriginal people having the ability to efficiently store fat in times of plenty. This was referred to as the thrifty genotype hypothesis. It was believed that this genetic susceptibility was not expressed in a traditional hunter gatherer context. In an obesogenic environment however, it was believed that this metabolic adaptation that conferred insulin resistance was conducive to excess adiposity and diabetes.

In the late 1960s, Wise reported a high proportion of obesity among people newly diagnosed with type 2 diabetes living in the Davenport Mission in South Australia. Subsequent studies supported the thrifty genotype hypothesis where “urbanisation” (characterised by access to a purchased food supply and low levels of physical activity), was found to be associated with excess adiposity and diabetes. However the findings from further studies conducted among different population groups exposed to varying degrees of “westernisation”, signified a complex interaction of genetic susceptibility and environmental conditions. To illustrate this,
high diabetes prevalence were reported among populations with relatively low levels of overweight and obesity\textsuperscript{75,84} and similar insulin responses were reported between two groups of lean young men considered to be living in contrasting environments in terms of degree of “urbanisation”\textsuperscript{74}. The inappropriately high fasting insulin and triglyceride levels measured in a group of Aboriginal people who were remarkably lean and still lived a subsistence lifestyle, were considered to indicate a predisposition to diabetes and obesity\textsuperscript{73}.

O’Dea\textsuperscript{85} in a review of published literature on the impact of westernisation on obesity, non-insulin dependent diabetes and coronary heart disease in Australian Aboriginal people, cautioned against automatically assuming genetic origins of diabetes as there are many other possible causal factors such as maternal nutrition and low birth weight. Gault et al\textsuperscript{76} for example demonstrated proximity to a store as an important influence on prevalence of overweight and diabetes. The apparent health benefits of living in homeland\textsuperscript{†} communities as opposed to centralised communities, where it is perceived that people have greater mastery over their lives and are exposed to less stress, led to the consideration of psychosocial factors playing a part in the causal pathway of diabetes experienced among Aboriginal people\textsuperscript{6,86,87}. Prior to this, O’Dea\textsuperscript{88} commented on the perceived change in sense of “self respect” on pursuing a traditional lifestyle, compared to town living and suggested a link between self determination, land rights and health.

Until the early 1990s, diabetes was rarely detected among people less than forty years of age and was considered to be strongly age related\textsuperscript{84}. A follow-up prevalence study conducted among people living in Ntaria (Hermannsburg) community in Central Australia reported metabolic abnormalities occurring before 40 years of age\textsuperscript{3}. The age of onset of diabetes since this time has continued to decrease among Aboriginal populations. Braun et al in 1996\textsuperscript{11} reported that metabolic abnormalities were established in the second decade of life, and recommended, as have subsequent researchers\textsuperscript{3,5,11,78,89}, that primary prevention of excessive weight gain and diabetes needs to occur in childhood and adolescence.

\textsuperscript{†} Homelands refer to areas of ancestral lands where basic infrastructure has been established to support related family groups.
Whilst the majority of researchers have argued that remaining lean protects against diabetes\textsuperscript{78,81,90}, an unusual observation was made by McDonald and co-workers among a population of Aboriginal people on the Tiwi Islands in northern Australia where leanness did not confer protection from mortality\textsuperscript{91}. In this sense, being overweight was thought to be indicative of a relatively more affluent lifestyle, compared to fellow community members with a low Body Mass Index (BMI), which in turn may have prevented adverse health outcomes related to disadvantage and poverty. There are no other studies on mortality and BMI in Australian Indigenous populations to see whether this observation can be generalised. What is of importance however is that Leonard et al\textsuperscript{92} and Wang et al\textsuperscript{77} have reported high prevalence of other risk factors associated with diabetes such as albuminuria and hypertension in the absence of both diabetes and obesity, suggesting complex causal pathways and influencing factors.

Whilst these studies demonstrate that the focus to date has been on individual level causal factors in understanding the determinants of type 2 diabetes, there is compelling evidence that a complex interplay of social, environmental and economic factors are undermining the health of Aboriginal people\textsuperscript{10,16,38} of which diet is a part\textsuperscript{16}.

\textbf{2.2. Nutrition among Aboriginal people in remote Australia}

Three studies conducted in the 1970s among small Aboriginal population groups in Western Australia showed poor nutrition in association with unsatisfactory environmental conditions. The first study was conducted in 1975 and collected dietary data for 14 children aged three to five years using 24 hour recall and food purchase data for 8 households\textsuperscript{93}. The diet of households in the “reserve”, where educational and employment levels were low and housing and sanitation facilities inadequate, was shown to be inferior to that of households living outside of the “reserve” in more adequate housing, with concomitant higher levels of education and employment\textsuperscript{93}. 

A second study compared the dietary intakes of 29 Aboriginal children and 43 non-Aboriginal children aged between 4 and 12 years using 24 dietary recall on three occasions in a one year period. Thiamine, riboflavin and vitamin C intakes were reported to be lower among the Aboriginal children compared to the non-Aboriginal children. A third study compared differences between children with satisfactory and unsatisfactory weight status at one year of age. Higher levels of low birth weight, inadequate household water and sanitation facilities, gastrointestinal disease, low maternal education and having a sibling less than 24 months old were reported among the low weight for age group.

In 1979, Coles-Rutishauser reported (using purchased food records over a 7 day period among 170 Aboriginal people living in an area of Western Australia), a high consumption of sugar and a low contribution of fruit and vegetables to total energy compared to wider Australia. A dietary study in the early 1980s, using 24 hour dietary recall on three occasions over a 22 month period among 129 Aboriginal children aged between 8 and 12 years, reported meat, flour, sugar and powdered milk as the dietary staples. Cutter observed in the 1970s that the quality of the diet observed over several months among Aboriginal people on a settlement in Central Australia, generally varied with the pay cycle, where a wider range of foodstuffs, such as bread, meat, tinned jam, fruit, vegetables, eggs, butter and biscuits, were purchased when sufficient money was available. During the off-pay week the diet simplified to bread, damper, sweet tea and foraged foods. Greater quantities of meat were observed to be consumed by people connected with pastoral stations.

An analysis of a number of mainly ethnographic studies conducted in the 1970s and early 1980s, involving communities and/or homelands in remote Australia, reported similar consumption and food expenditure patterns: food expenditure as the most significant financial outlay; high consumption of meats, cereals and sugars; expenditure dictated by the need to procure foods that were cheap and filling; an increasing importance of convenience foods; and poorer quality diet with the off-pay week of the fortnightly social security payments.

An assessment of diet among people in remote communities was conducted by Lee et al. in the late 1980s in six remote communities in the Northern Territory including
three Central Australian communities and three northern coastal communities. Lee et al\textsuperscript{8} assessed the nutritional composition of the diet available for purchase through the community store, which on most communities in the 1980s was the single food outlet. The dietary assessment did not include the availability of traditional foods. Similarly to earlier studies, Lee et al\textsuperscript{8} described a diet high in energy and sugars, moderately high in fat and relatively low in fibre and micronutrients. Sugar, flour, bread and meat were reported to provide more than half the apparent total energy intake. Fatty meats contributed 40 and 60 per cent to total fat intake in the Northern Coastal and Central Australian communities respectively\textsuperscript{8}. In contrast to the high intakes of energy, sugar and fats, Lee et al\textsuperscript{8} reported low intakes of dietary fibre, calcium and zinc and riboflavin, vitamin E, β-carotene and folic acid.

While researchers have reported similar patterns of dietary intake across communities, differences have also been reported. A smaller dietary study performed at a similar time to the study by Lee et al, in the rural New South Wales township of Kempsey, reported similar intakes of carbohydrate, fat and protein derived from energy, to that of wider Australia\textsuperscript{99}. This study was conducted among 38 Aboriginal adults surveyed across 31 households and used 24 hour dietary recall\textsuperscript{99}. Similar to that reported by Lee et al\textsuperscript{8}, on examining records of individual store purchases over a fortnightly pay cycle among the people of Milikapati, (a small island township in Northern Australia), Harrison\textsuperscript{100} reported sugar as the largest contributor to energy, and low intakes of store bought fruit and vegetables and dairy products. However, in contrast to that reported by Lee et al, Harrison reported that the store diet contained a lower percentage of energy from fat compared to the average Australian diet\textsuperscript{100}.

An inadequate intake of fruit and vegetables continues to be reported for Indigenous Australians. The National Aboriginal and Torres Strait Islander Health Survey 2004-05, revealed that in contrast to 12% of Indigenous people in non-remote areas, 20% of Indigenous Australians in remote areas reported no usual daily fruit intake. The disparity was even greater for vegetables with 15% of people in remote areas reporting no usual intake compared to 2% in non-remote areas\textsuperscript{101}. Beyond these studies, there is little available research on contemporary dietary intakes of Aboriginal Australians.
2.3. Contribution of traditional food to diet

Traditional foods are generally recognized by researchers to contribute significantly to contemporary Aboriginal peoples’ social and cultural well-being. The contribution of traditional foods to diet however is a contentious area and has not been quantified\textsuperscript{102}. Due to difficulties of quantifying intake, studies of traditional food use have tended to reflect dietary patterns and preferences rather than actual, habitual intake\textsuperscript{103}. These studies have all been undertaken among small family groups living on their homelands. Altman et al contend that depending on the ecological, geographic and economic circumstances, opportunities exist in some situations for people to switch between purchased commodities and self provisioning\textsuperscript{102}. An example provided by Altman et al is that access to traditional foods varies according to whether people live in townships or homelands, coastal or desert locations and whether they have access to vehicles and fire-arms\textsuperscript{102}.

In some regions of Australia, there is an abundance and extensive variety of flora and fauna available for food use. For example, one-hundred and thirteen plant species alone have been documented by the Rirratjingu people of Yirrkala in North-East Arnhem Land\textsuperscript{104}. Some researchers estimate that over 90 per cent of foods are purchased and traditional foods contribute less than 5 per cent to dietary energy intake\textsuperscript{8}, others argue that in some contexts the proportion of purchased foods is much lower\textsuperscript{102}. Previously in the late 1970s and early 1980s, the contribution of traditional foods to energy intake was shown to be as high as 50 per cent among the Gunwinggu people of Momega homeland in north-central Arnhem Land\textsuperscript{105} and up to 65 per cent, depending on the season, among the Anbarra people on the northern coast of Arnhem Land\textsuperscript{35}. Among the people of Milikapiti, Harrison estimated that during the dry season in 1983, the principal item of one quarter of meals was a traditional animal food\textsuperscript{106}.

The 1994 National Aboriginal and Torres Strait Islander survey indicates the contemporary importance of traditional food. Nationally, eleven per cent of people aged over 15 years reported to spend time hunting, fishing and gathering traditional food. Of these people, more than half reported spending more than five hours per
week acquiring traditional foods\textsuperscript{107}. For people living in remote townships, hunting and gathering is normally described as a week-end and leisure time activity\textsuperscript{106}.

Traditional foods have been shown to be nutrient dense and to have properties protective against type 2 diabetes and cardiovascular disease\textsuperscript{108,109}. The green plum \textit{[Terminalia ferdinandiana]}, for example, has been shown to have the world’s highest vitamin C content\textsuperscript{110}. Traditional animal foods tend be low in fat, with a high proportion of polyunsaturated fatty acids which is thought to have protected Aboriginal people against cardiovascular disease, obesity and diabetes\textsuperscript{108}. The carbohydrate in traditional foods has been shown to be more slowly digested and absorbed than the carbohydrate in western diets\textsuperscript{111}.

Among the Indigenous populations of Northern Canada, who like Aboriginal Australians traditionally hunted and gathered their food, the transition from a traditional food base to a western food base has been characterised by an increasing prevalence of obesity and preventable chronic disease in association with decreasing physical activity, higher energy intakes and increasing use of processed food high in starch, fat and sugar\textsuperscript{112-116}. According to Pelto and Pelto\textsuperscript{117}, delocalisation of the food supply, which includes the process by which food species and varieties, production techniques and use patterns are globally disseminated, has been a major determinant of global dietary change. Kuhnlein and Receveur believe that delocalisation of the food supply increases the availability of food species and benefits those who can afford them\textsuperscript{113}. For Indigenous peoples however, particularly those in rural areas and less-industrialised countries, Kuhnlein and Receveur\textsuperscript{113} believe there may be an opposite effect, where a decreasing diversity of food items are consumed, as people use less of their traditional foods and rely more on limited purchased foods.

In Australia, traditional food use and its contribution to diet has not been given the same attention as it has in Canada. Reasons for this are multiple and relate back to early colonisation when the food and food habits of Aboriginal people were considered by non-Aboriginal people as primitive and inferior. Separating people from their traditional practices which included the hunting and gathering of food was an underlying motive of government through to the mid 1970s to assimilate
Aboriginal people to western society, its norms and practices. While the contribution of traditional food to cultural well-being is recognised in the health literature, its contribution to contemporary diets has been essentially dismissed as not important. Furthermore, the mix of language groups centralised on remote Australian communities that may or may not represent their ancestral lands, introduces complexities in gaining the correct permissions in a study of traditional food use. Aboriginal people have a deeply guarded spiritual connection with the flora and fauna. A study of traditional food use among people in a centralised community would need to be initiated and fully supported by the traditional authorities in a community. An extended study time would also be required to capture the variation in consumption with the six seasons of the Aboriginal calendar.

Dietary change for Indigenous peoples in the Canadian Arctic has resulted in traditional food providing between 10 and 36 per cent of total dietary energy\(^\text{112}\). The traditional food portion of people’s diet however was shown to be denser in protein and most micronutrients where the store purchased component of the diet was denser in carbohydrate, fat, sucrose and sodium\(^\text{112,114}\). An increasing reliance on purchased foods has been documented among younger people in the Canadian Arctic compared to older people\(^\text{112,114,116,118}\), with a concomitant higher consumption of fat and sugar\(^\text{114}\). The types of store foods used consistently and most frequently across the Canadian Arctic provide the least-cost sources of energy and as a whole have poor nutrient density\(^\text{112}\). Although significant in improving the quality of the diet, traditional food as a component of the total diet has not been shown to be protective of overweight and obesity\(^\text{112,115}\).

This insight into contemporary traditional food use demonstrates the broader dietary, social and cultural contribution of traditional food despite its lesser role in contributing to total energy.
2.4. Objectives of literature review

This literature review has four main objectives:

1. To identify the key factors perceived as influencing nutrition and nutrition improvement among Aboriginal Australians living in remote communities in the NT.
2. To identify opportunities, challenges and barriers to nutrition improvement for Aboriginal people in remote communities and current intervention approaches.
3. To review international literature in the context of community-based interventions and preventable chronic disease to identify models and key approaches, considered important to enabling nutrition improvement.
4. To develop an argument for a systems/social-ecological approach to nutrition improvement in remote Aboriginal communities.

2.5. Conceptual framework to understand factors influencing nutrition

The literature presented, clearly demonstrates that there are proximal and distal factors contributing to poor nutrition among Aboriginal people. Within both a systems and ecological perspective, causes of ill-health, including poor nutrition, are considered to be located primarily in the economic, social and political domains, many of which are outside of the individual\textsuperscript{119}. The view of socio-ecological theory is that the environment largely controls or sets limits on behaviour. Therefore the underlying assumption is that changing environmental variables will result in behaviour change\textsuperscript{69}.

This broader holistic perspective does not deny human agency. In fact, a key attribute of a social-ecological approach is the view that changes at the individual level, can, in turn, influence the broader systems of which individuals are a part\textsuperscript{120}. This view has supported health education and empowerment theory to remain as an important construct of health promotion. The key constructs of social-ecological theory in relation to health behaviour are: reciprocal determinism, where the
environment influences the individual and in turn can be influenced directly by the individual, groups or organisation\textsuperscript{121}, multiple levels of influence on behaviour\textsuperscript{122,123}, and, the environment being able to directly influence behaviour without being mediated by a change in individual beliefs, skills, attitudes or knowledge\textsuperscript{60,61}.

According to Green and Kreuter\textsuperscript{69}, in order to support health, three broad determinants of health must be addressed in a socio-ecological model:

- The environment must offer economic and social conditions conducive to health
- These environments must provide life skills so individuals can make decisions to engage or not engage in behaviours that maintain their health
- Healthful options among the goods and services offered must be available

In the context of the present study, the term environment refers to everything external to the individual and refers to both the physical and social environments\textsuperscript{63}. The physical environment refers to the physical structures or products that can reduce or enhance opportunities for “healthy” behaviours such as consumer products, houses, stores and schools\textsuperscript{124}. The social environment refers to the social structures such as laws or policies that regulate behaviours through guidelines, formal and informal enforcement, and social norms or accepted ways of doing\textsuperscript{124}.

The multiple levels of influence on behaviour were originally described by Bronfenbrenner\textsuperscript{123} as the micro- (the most proximal context in which an individual participates such as family, peers and school), the meso- (the linkages between the microsystems, such as interrelationship between individual and household), the exo- (the larger social system such as media and community influences) and the macro-systems (cultural norms, economic systems and political systems). In the context of nutrition, Story et al\textsuperscript{125} have summarised the factors influencing nutrition according to four levels of influence. The characteristics in each level are interdependent and interconnected with other levels of influence. These are presented in Figure 2.1. The individual and interpersonal levels depicted in Figure 2.1 relate to the micro-system as defined by Bronfenbrenner’s model; the physical environment relates to the
mesosystem and the linkages between the individual and community settings and the macrosystem, relates to both the exo- and macro-systems.

Figure 2.1 An ecological model of influences on nutrition

The characteristics in each of these levels of influence include the predisposing, enabling and reinforcing influences described by Green and Kreuter. For example, the intrapersonal factors at the individual level such as knowledge of food value, beliefs about the health benefits of good food and food preferences are predisposing factors that provide the motivation to eat or not to eat healthy food. The enabling factors that help a person or organisation to perform a desired action, such as cost of food and availability, food preparation skills and resources for health action, may
need to be considered at all levels of the ecosystem. The reinforcing factors that determine if behaviour is socially rewarded may also occur at different levels of the system. The point is that while there are predisposing, enabling and reinforcing influences on health, these occur at multiple levels of influence.

2.6. Factors influencing the nutrition of Aboriginal people living in remote communities in Australia

Much of the available literature in relation to Aboriginal nutrition in remote Australia comprises unpublished reports of nutrition programs and activities. At the organisation level, the literature focuses on food accessibility. The “upstream” or macro-level determinants of nutrition are identified in the literature as important determinants of nutrition, however there has been little empirical research in relation to the nature and consequences of these influences at the level of the individual and family unit. The research that has been carried out has tended to focus on the store. Ethnographic studies have contributed to an understanding of the social-environmental influences on nutrition. This insight however has not been adequately incorporated into government programs and policies. Nutrition practice as a result of this has largely been developed on unexamined assumptions and generalizations of Aboriginal nutrition. The key factors identified in the literature influencing nutrition, that relate to access, cost, availability and food quality are summarised in Table 2.1 in relation to the four levels of influence as depicted in Figure 2.1.

Table 2.1 Factors influencing nutrition of Aboriginal people in remote communities as identified in the literature
<table>
<thead>
<tr>
<th>Macro level</th>
<th>Access</th>
<th>Cost</th>
<th>Availability</th>
<th>Demand</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment/ Low income\textsuperscript{34,37}</td>
<td>Transport cost\textsuperscript{51}</td>
<td>Community size\textsuperscript{45}</td>
<td>Seasonality\textsuperscript{51}</td>
<td>Education levels\textsuperscript{34,37}</td>
<td>Transportation: frequency of delivery, duration, inappropriate transit temperatures\textsuperscript{51}</td>
</tr>
<tr>
<td>Education level\textsuperscript{34,37}</td>
<td></td>
<td>Community size\textsuperscript{51}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community control/ disempowerment/ cultural change\textsuperscript{132}</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Land rights and conservation laws\textsuperscript{132}</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Physical environment</td>
<td>Household infrastructure\textsuperscript{34,37}</td>
<td>Nature/ culture of the store enterprise\textsuperscript{130}</td>
<td>Price of food\textsuperscript{133}</td>
<td>Display and presentation of fruit and vegetables\textsuperscript{51}</td>
<td>Display and presentation of fruit and vegetables\textsuperscript{51}</td>
</tr>
<tr>
<td>Store management practices: store inefficiencies, debt recovery, external management advice\textsuperscript{126,130}</td>
<td>Store management practices\textsuperscript{126,129,130}</td>
<td>Store management practices\textsuperscript{126,129,130}</td>
<td></td>
<td>Transport for shopping\textsuperscript{131}</td>
<td>Transport for shopping\textsuperscript{131}</td>
</tr>
<tr>
<td>Stock spoilage\textsuperscript{126,130}</td>
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<tr>
<td>Pilfering\textsuperscript{126,130}</td>
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<tr>
<td>Social environment</td>
<td>Distribution of income\textsuperscript{34,37}</td>
<td>Misuse of substances (alcohol and tobacco)\textsuperscript{34,37}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro level</td>
<td>Access to banking facilities\textsuperscript{34,37}</td>
<td>Knowledge of consumer rights</td>
<td>Access to nutrition information\textsuperscript{34,37}</td>
<td></td>
<td>Brand loyalty\textsuperscript{126}</td>
</tr>
<tr>
<td>Financial management practices\textsuperscript{130}</td>
<td></td>
<td></td>
<td>Nutrition knowledge\textsuperscript{34,37}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of traditional lifestyle and access to traditional foods\textsuperscript{128}</td>
<td></td>
<td></td>
<td>Awareness of relationship between preventable chronic disease and nutrition\textsuperscript{34,37}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of culturally appropriate nutrition information\textsuperscript{4,34,37}</td>
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<tr>
<td>Nutrition knowledge\textsuperscript{4,34,37}</td>
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2.6.1. Physical factors influencing nutrition

This section reviews two important factors influencing nutrition, availability of food and food affordability. The national and Territory food-related policies aim to modify these two factors primarily, in order to achieve an equitable food supply and nutrition improvement for Aboriginal people in the remote areas of the NT. For each of these factors I review the available evidence, determining factors and their influence on nutrition as identified in the available literature.

Price of food and affordability

Available evidence

High food prices in remote communities relative to urban centres have been consistently documented in the NT and other remote areas of Australia since the 1980s\(^{134-137}\). The 1999 Legislative Assembly of the NT inquiry into food prices, considered people in remote areas of the NT disadvantaged in terms of price, variety and quality of food supplied, particularly in relation to perishable foodstuffs\(^{133}\).

Since its inception in 1998, The NT annual Market Basket Survey\(^{138}\) (MBS) has consistently confirmed the inflated cost of food in remote Aboriginal communities. On average, the cost of the food basket in remote stores in 2005 was 32% more expensive than a Darwin supermarket. This cost differential ranged from 26% to 53% across the NT remote communities. While the cost of the food basket was consistently higher in remote areas compared to urban areas, the cost of the food basket over a seven year period (1998-2005) had not increased more than the consumer price index (CPI).

A similar cost differential (29.6%) between the cost of a Healthy Food Access Basket (HFAB) in very remote areas compared to major cities in 2004 was reported for Queensland\(^{137}\). In contrast to that reported for the NT, the annualised per cent increase in cost of the HFAB since 2000 had been higher than the increase in CPI for food in the capital city. This increase was highest for very remote areas. Differences
in cost between remoteness categories was highest for the “bread and cereals” and “dairy foods” and lowest for “vegetables and legumes”, “meat and meat alternatives”\(^{137}\). Unhealthy items were reported to attract the lowest price increase compared to the other food groups, however the cost of only three items was examined.

**Determining factors**

The Legislative assembly of the NT inquiry into food prices attributed a number of factors to the high cost of food in remote communities. These were small population size (and therefore the community store not having the buying power to negotiate deals with suppliers and transport companies), freight costs, stock spoilage with transportation, inefficiencies in store operations (such as stock management), and community stores being business monopolies.

In addition to these factors contributing to the high cost of food, the 1994 submission to the Western Australian Social Justice Commission\(^{139}\) identified debt recovery, cost of external store management advice, and the nature of the store enterprise as key contributors to the high cost of food. The “nature of the store enterprise” refers to the model of store and control management\(^{133}\). There are many different roles expected of stores. Four models of store and control management have been identified. These are: 1) the store is run by a store manager who is a direct employee of the local community council; 2) the store is an asset of an incorporated association, which is independent to the local community council; 3) store profits are taken up in paying royalties to the “power brokers” of the community; 4) the store is leased by the community to private enterprise\(^{133}\).

While freight subsidies have been a favoured solution to redressing food cost disparities\(^{51}\), McDonnell and Martin\(^{140}\) believe that the cost of freight is less than perceived in the overall cost structure of stores and that store governance structures may be of more significance. Over a two year period of observing a community store in the Katherine region, Lewis\(^{141}\) reported that the financial deterioration observed which contributed to the high cost of food, seemed likely to be due to either extremely poor management, large amounts of pilfering, stock shrinkage or loss, or
fraudulent behaviour. The likelihood of store operations as an important contributor to high food costs rather than freight alone has supported an approach of examining store management practices, retailing practices, and pricing policies, to uncover inefficiencies where savings may be made and in turn prices reduced\cite{50,50,142}.

**Influence on nutrition**

According to McMillan\cite{126}, Aboriginal people in remote communities are vulnerable to price exploitation as they seem unaffected by price increases or decreases. In his many years working with remote community stores in the 1980s, McMillan observed strong brand loyalty by Aboriginal people. This view that Aboriginal people’s buying patterns may be resistant to change because of brand loyalty, does not necessarily contrast with that of Scrimgeour et al\cite{143} who observed that children’s purchasing patterns could be altered in association with intervention. This was achieved through making desired foods more accessible and through education, rather than through altering price.

A view shared by some health professionals, is that the price index on foods not recommended in remote communities, such as high fat take-away food, is not as high as in urban centres, thereby encouraging purchases of these products\cite{136,137,144}. In some communities however, price differentials in remote community stores are used as a way of reducing margins on recommended foods and increasing mark-ups on products not recommended such as cigarettes and some take-away foods\cite{126}.

Low income combined with high food costs results in many Indigenous Australians spending a large proportion of their income on food\cite{37}. In the absence of household expenditure data for Aboriginal Australians, Altman et al\cite{102} contend that it is difficult to ascertain the impact of high store prices on standard of living as other expenditures cannot be quantified. For example, the proportion of household income spent on rent may be less in a remote community than in an urban area, thereby resulting in more disposable income for food. The reality however is that in addition to high food costs, Aboriginal people in remote areas pay more than in urban areas for all essentials and luxury goods such as petrol, household goods, furniture and white goods\cite{126}.
In the early 1980s, when remote communities were not as accessible and fewer goods were available to people, Harrison held the view that Aboriginal people living in remote communities in the NT were able to cover their store food needs on low levels of income, “leaving a surplus for other items”\textsuperscript{106}(p 134). Harrison reported that due to higher food costs and lower incomes, the people of Milikapti community spent approximately 33\% of their income on food compared to the lowest Australian income group which spent 23.5\% of their income on food\textsuperscript{100}.

Observations of children being given substantial amounts of money by relatives has led some researchers to conclude that children have sufficient disposable income to provision themselves from food outlets\textsuperscript{145,146}. This implies that it is food preference rather than financial constraint driving young people’s food choice. Others however, have not been as positive in their assessment of food security. Treganza determined that a household in the Anangu Pitjantjatjara Yankunytjatjara Lands (APY Lands) could not afford to buy food to meet their nutritional requirements and advocated for government subsidies on healthy food\textsuperscript{147}.

The relationship between high store prices and affordability has not been rigorously tested\textsuperscript{102}. However there is evidence suggesting that Aboriginal people are clearly disadvantaged by a combination of high store prices and low incomes. A disproportionate expenditure on food relative to income has been proposed as a reliable indicator of deprivation and poverty\textsuperscript{148}. In an analysis of available empirical Aboriginal expenditure data, Smith concluded that Aboriginal expenditure levels and patterns differed significantly from those of the wider Australian population, and that the expenditure patterns of many low-income Aboriginal households were indicative of poverty\textsuperscript{149}. Ethnographic studies conducted over a wide range of Aboriginal communities and homelands during the 1970s and 1980s, reported expenditures on food and non-alcoholic beverages of between 33 to 65 per cent of income\textsuperscript{149}. This was in comparison to 20 per cent of income being spent by Australian households on food among the lowest income quintile group and 14\% of all Australian household income being spent on food\textsuperscript{149}. Smith concluded:

The expenditure patterns of many low-income Aboriginal households are indicative of poverty: income levels are not even sufficient to meet basic material needs. Low-
income Aboriginal households appear to be spending a higher proportion of their incomes on what are considered to be the basic necessities of life such as food, than the lowest income households amongst the total population. In these circumstances, Aboriginal expenditure is also characterised by expenditure on poor quality, cheap foodstuffs, second-hand goods, reliance on credit and on subsidised services. It appears that higher price of food and other goods at remote communities exacerbates Aboriginal poverty.

Supporting the findings of Smith, Finlayson and Auld concluded from a detailed study among five households in Northern Queensland, that for many Aboriginal households the critical budgetary decision is prioritising choice between the material needs, and that of the regular daily demand to eat. The National Indigenous health survey showed that nearly thirty percent of Aboriginal adults worry at least occasionally about going without food, indicating extensive food insecurity. The percentage of people reporting worrying about going without food, increased to more than 65% in the Nhulunbuy region of the NT, a very remote region of the NT that includes the study community. In 2002, 30% of Indigenous Australian households reported days without money in the last two weeks. It is likely that high food costs in association with low income contribute to financial insecurity and associated food insecurity.

Availability of food and its influence on the nutrition of Aboriginal people in remote communities in the NT

Available evidence

The Australian Guidelines for Healthy Eating are based on empirical evidence linking diet with disease. The availability of foods consistent with the Australian Guidelines for Healthy Eating thereby increases a person’s ability to attain good health. However the availability and range of healthy foods is often limited in remote communities. Perishable items in particular such as dairy foods, fruit and vegetables have been shown to be frequently in short supply.
The NT MBS reports on availability of a standard food basket (sufficient to feed a family of 3 adults and 3 children for 2 weeks) as well as on cost and food quality. In 2005, across the nine stores surveyed in the East Arnhem Land district which includes the study community store, the availability of foods in the food basket ranged from 85% to 100%. However, the MBS was designed within the constraints of providing food to remote communities and includes a range of very basic but practical food items. It is a once a year snapshot of the food quality, availability and price and does not capture fluctuations in availability over time such as the few days preceding delivery when fresh fruit and vegetable stocks are commonly depleted or near depletion in some community stores. The availability of foods however in the Market Basket in general has substantially improved since a decade earlier. In 1995, Rae reported that in many communities only 60% of items in the market basket were consistently available, compared to 2005, where an average of 96% of items were available across the community stores surveyed in the NT.

**Determining factors**

The availability of food is normally determined by supply and demand. The key factors identified in the literature as influencing store food availability are summarised in Table 2.1. These are: attitudes and practices of store managers in relation to supporting nutrition improvement; attention to adequate provisioning of recommended foods; in-store marketing and consumer education; adequate store storage facilities and reliable transport for food delivery to the store.

Both Rowse et al and Lee et al have commented on store manager compliance in relation to efforts to improve the availability and nutritional quality of the food supply. In 1996, Lee et al demonstrated the influence of store managers on the availability of nutritious food in remote community stores. Differences in the nutritional quality of the food supply in two stores were observed that corresponded with the period of employment of three different store managers. One of the three store managers was shown to be more effective in nutrition improvement of the food supply through ensuring daily availability of fresh fruit and vegetables, wholemeal bread, and sandwiches in the take-away. Store-based strategies to influence the
purchasing behaviour of young people in a Central Australian community were more effective in the food outlets with a supportive manager.\textsuperscript{143}

\textit{Influence on nutritional quality of the food supply}

The consumption of fresh fruit and vegetables in remote Aboriginal communities has been shown to be very inadequate.\textsuperscript{8} In contrast to the reality, availability of fresh fruit and vegetables in most remote community stores is not reported by the MBS to be an issue. In the nine stores surveyed in the East Arnhem Land region stores, the average number of fresh fruit choices ranged from 3 to 17 and fresh vegetables choices, 6 to 18, with nearly 90\% of the produce rated subjectively as ‘good quality’. The MBS however does not provide an indication of the nutritional adequacy of the food supply for the population.

There are many intermediary factors between availability and consumption. As with cost of food, it is difficult to isolate availability and investigate its impact alone on nutrition improvement. The studies that have modified availability of recommended foods and reported on subsequent purchasing behaviours\textsuperscript{145} and health outcomes have done so in combination with multiple strategies including marketing strategies, consumer education, modifying store ambience and community-wide and school-based education activities\textsuperscript{3,53,156}.

Goto\textsuperscript{131} performed a longitudinal assessment of food orders in a remote community store in Western Arnhem Land from 1988 to 1995. This study provides an interesting insight into food trends and contributing factors in a remote community and demonstrates the interdependent supply-demand relationship without directed nutrition intervention. For example, wholemeal flour was ordered in 1989, but was not reordered as white flour was found to be generally preferred. Whereas orders for both reduced fat milk and packaged convenience foods continued, and increased, once introduced.

Factors such as food price, improved store storage capacity, availability of convenience type foods, improved transport to and from the store, and increased exposure to advertising were observed by Goto to influence turnover of particular
foods without concomitant consumer education efforts\textsuperscript{131}. For example, Goto\textsuperscript{131} observed that store food orders increased after 1992 in association with a reduced mark-up on chilled and grocery items. A striking change in food orders occurred in 1994. This coincided with the commencement of a store community shuttle service, weekly rather than fortnightly barge deliveries, and store renovations to improve storage and refrigeration capacity. Goto\textsuperscript{131} observed that the store community shuttle service enabled people to buy larger quantities of flour and sugar, in tins, that could later be used for cooking and food storage.

A further example of improvements in availability without directed nutrition intervention was reported by Taylor and Westbury in relation to the Barunga store in the East Katherine region of the NT\textsuperscript{157}. Improvements in the availability of fresh fruit and vegetables, fresh sandwiches and leaner cuts of meat occurred as the result of a “whole-of-store” approach to improving food quality through better business practices. This whole-of-store approach included employment and training, and developing and implementing stock management procedures\textsuperscript{157}.

2.6.2. Social factors influencing nutrition and nutrition improvement among Aboriginal people on remote communities in the NT

Inter-individual level factors

Knowledge

Most of the knowledge of inter- and intra-individual level factors influencing nutrition such as knowledge, food preferences and intra- and inter-household dynamics is derived from unpublished ethnographic literature. An ethnographic study by Saethre\textsuperscript{158} recently undertaken on a remote community in Central Australia is particularly relevant to this review. Saethre\textsuperscript{158} endeavoured to understand the factors influencing nutrition when, according to him, a range of nutritious food was readily available through both the store and take-away, and people within the community demonstrated an understanding of the health consequences of eating poorly. Saethre\textsuperscript{158}, similarly to Smith\textsuperscript{159}, observed that people expressed a
demarcation between store foods and traditional foods in terms of health. Store foods were considered to make people sick, and traditional foods to make people well

In the community where Saethre based his study, particular food properties such as fat and sugar content, were associated with specific diseases such as heart disease and diabetes. People also differentiated between the properties of fat in domesticated animals compared to hunted animals. Smith however, questioned the level of understanding that Aboriginal people demonstrated with regards to store food and sickness, and thought that people were able to repeat messages taught to them, but had not necessarily internalised the knowledge. This is a view held strongly by Richard Trudgeon, an ex-missionary of the East Arnhem Land regions who holds that the Aboriginal people of North East Arnhem Land are confused and mystified by the non-Aboriginal world, as a result of different world views and ineffective education and communication. Lack of consumer knowledge is invariably listed as a factor influencing nutrition of Aboriginal Australians in remote communities. Very little data are available from which to assess the effects of knowledge and food literacy on diet and nutrition.

Food preferences

Saethre elaborated on three factors he believed to influence nutrition: familiarity with food, income, and norms of reciprocity. In discussing familiarity, Saethre related contemporary eating patterns to eating patterns that were established in the rationing era of government administration. The familiarity of certain foodstuffs such as flour, sugar and tea, established in the rationing era, and conservative dietary behaviour is viewed as underlying contemporary food preferences. Goto however demonstrated that Aboriginal people’s diet was not static, and that as new foods entered the market, Aboriginal consumers responded to either incorporate these new foods into their diet or reject them. Not surprisingly, foods with convenience qualities were observed by Goto to be more readily incorporated into the everyday diet.
**Intra-individual/household factors**

**Reciprocity**

Whilst habit is an important factor in determining food choice, socio-economic conditions are key determinants. The pay-week/off pay-week cycle in relation to nutrition has been noted in the literature and is commonly referred to as the feast and famine cycle\(^8,98,157,158,163-165\). One view is that the feast/famine cycle where the quality of people’s diet is better for the days immediately after receiving pay and then deteriorates over the following off-pay week, is created and reinforced by cultural factors.

The practice of reciprocity which anthropologists\(^{150,166}\) refer to as “demand sharing” and Gibson\(^{167}\) in reference to gambling and alcohol use, as “parasitism”, is intrinsic to Aboriginal culture. Kinship obligations such as sharing influence shopping behaviour, food storage in the household and eating behaviour. For example Saethre observed that when money was received, community residents would spend a great deal of it at the store at once, as shopping on the days that government or community employment cheques arrived diminished the number of people requesting food and/or money, as others also had enough money\(^{158}\). This observation is supported by ethnographic work of Musharbash who reported a similar expenditure pattern among Aboriginal people of Yuendemu community in Central Australia\(^{168}\). Earlier ethnographic descriptions of food expenditure reported similar behaviours\(^{99,146}\). The emphasis on reciprocity in Aboriginal culture together with the general rejection of material accumulation is considered by Sutton to make Indigenous conditions such a “challenge to reformers”\(^{169}\). Cultural expectations can mean that when increased income is available it is redistributed and not necessarily spent on better quality food\(^{149}\).

**Overcrowding and Household infrastructure**

Inadequate housing has been associated with the poor health of the Australian Indigenous population. In 2002, it was estimated that 26% of the Australian Indigenous population lived in overcrowded houses. In an area of Northern
Queensland, Finlayson and Auld reported over 20 people living together in standard three bedroom homes with a high proportion of young children, and households often having an influx of visitors\textsuperscript{150}. Over 30 people have been reported to occupy a standard three bedroom house in some remote communities\textsuperscript{170}. Considering the circumstances of Aboriginal households, Finlayson and Auld commented that the complexities of Indigenous household financial management should be neither under-estimated nor trivialized, particularly when considering budget management as a nutrition strategy\textsuperscript{150}.

In a survey of household infrastructure in Aboriginal communities in the NT, facilities for food storage and preparation of food were most commonly in a poor state of repair\textsuperscript{171}. In 62\% of the houses surveyed, these facilities were described as non-functional. Facilities described as non-functional included the kitchen bench (26\%), the cook-top (41\%) and oven (42\%). Less than half (41\%) of the houses had a functioning refrigerator. A cold water tap to the kitchen sink was functional in 81\% of the houses\textsuperscript{171}.

\textit{Influencing factors and take-away food}

The 2003-04 Australian household expenditure survey revealed that Territorians (excluding remote areas and Indigenous communities) spent almost one half (47.9\%) of food and non-alcoholic expenditure on ‘meals out and fast foods’\textsuperscript{172}. The increasing popularity of take-away food in remote Aboriginal communities with generally limited choices available has become a concern for nutritionists and other health professionals. Saethre\textsuperscript{158} concluded that take-away food was not only a preferred source of food in the community but more importantly a less costly one in terms of money, time and cultural obligation.

In the early 1990s, Guest and O’Dea\textsuperscript{103} speculated that people frequently purchased take-away food due to lack of transport and thereby the need to make portable purchases. In one community, children aged 3 to 14, spent 75\% of their measured food expenditure at the take-away food outlets\textsuperscript{145}. In the same community, it was estimated that 40\% of all food and drink purchases occurred at the take-away outlets\textsuperscript{145}. Age seems to be as an important determining factor in purchasing take-
away food as what demand-sharing may be. Rowse et al reported that young people expended the greatest proportion of food money at the take-away. Compared to the under 15 year olds the proportion of food money expended at the take-away also steadily declined with each successive age-group.\textsuperscript{145}

Observations of purchasing routines at the Wujalwujal community store revealed that children’s expenditure, which accounted for 74\% of store transactions, was mainly on sweets and sweetened aerated beverages\textsuperscript{173}. Harrison found a similar pattern of expenditure among the younger age groups of Milikapati community\textsuperscript{100}.

\textbf{2.6.3. Summary of literature relating to factors influencing nutrition of Aboriginal people in remote communities in the NT}

Poor diet has been associated with type 2 diabetes and related conditions which are highly prevalent among the Aboriginal population in remote communities of the NT. The most recent research describing the diet of Aboriginal Australians in remote communities now dates back 20 years. Aboriginal Australians in remote communities have experienced a dramatic shift from a nutrient dense, relatively low energy traditional food base that was protective of chronic disease to a nutrient poor, energy dense diet that is detrimental to health.

There has been an emerging recognition in Australia to consider the more distal factors that influence lifestyle behaviours such as diet. These factors however have been under-researched. Socio-ecological theory and the PRECEDE-PROCEED model provide appropriate frameworks for exploring factors influencing nutrition. It is recognized that behaviour (including nutrition behaviour) occurs within a social context and results from a dynamic and complex interplay of environmental and individual conditions. Influences on nutrition need to be considered at the macro- (societal), community settings, social environmental (interpersonal) and the individual level. Within each of these levels there are factors that predispose, enable and reinforce nutrition behaviour.
There is little evidence-based information on factors influencing nutrition in the context of this multi-level model and little is understood about the reality of these influences on the everyday lives of people. Most of the knowledge on the socio-cultural aspects of nutrition has largely been derived from ethnographic studies. The two areas that have received greater attention in the public health literature are cost and availability of food. The reasons for this may be two-fold. Firstly the cost of food and its availability are the focus areas of national and Territory nutrition-related policy to achieve a more equitable food supply for Aboriginal people in remote Australia. Secondly, these two factors lend themselves to external intervention. The cost of food in relation to affordability has been under-researched.

There is good evidence that Aboriginal Australians in remote communities are disadvantaged both in terms of the price they pay for goods and services, and access to good quality nutritious food. There is insufficient available research to determine if the high cost of food prevents Aboriginal people in remote communities from accessing an adequate diet as that recommended for all Australians. This appears to be a contentious and under-researched area. The limited available research indicates that poverty is an important driver of nutritional quality of diets. There appears to be significant food insecurity among Indigenous Australians. This area has not been thoroughly explored in the literature.

In contrast to the observations of independent researchers, the current NT government monitoring tool (the MBS) does not highlight variable availability of some essential foodstuffs as a current issue. Availability of essential foodstuffs has improved since the mid 1990s. Improved availability of nutritious foods has been achieved in community stores through both intensive intervention in the store and community, and through non-directed store and organisational change alone.
2.7. Community-level interventions: Approaches to enabling creative environments for nutrition improvement and prevention of chronic disease

2.7.1. International community-based intervention studies to reduce the risk of preventable chronic disease

Community-based programs for prevention and control of cardiovascular disease (CVD) started in Europe and the US in the early 1970s. In the 1980s, these community-based programs widened to address chronic diseases in general, including type 2 diabetes, as they share common risk factors. These programs were initiated to determine if strategies applied across a whole population could significantly modify risk behaviour, thereby altering disease risk, where previously a high-risk individual approach to disease prevention prevailed. Clinical trials had previously demonstrated the link between preventable chronic diseases and behaviour and had shown that lifestyle modification through smoking cessation, increased physical activity and improved dietary quality could alter disease risk. Where disease risk is spread across a population, the aim of a population approach is to shift the disease risk of the whole population. Small changes at the population level can have greater public health benefit than larger changes in a high risk subgroup\textsuperscript{174}.

Finland, in response to community concern about high mortality rates from CVD, implemented a community-based program in North Karelia, an area of relatively low socio-economic status\textsuperscript{175}. The United States of America (USA)\textsuperscript{176,177} and Europe followed suit with similar programs. These studies, drew from behavioural change theories (mostly social learning theory, social network diffusion theory, social marketing and community organisation theory) to expose and engage whole communities in interventions to reduce the risk of cardiovascular disease\textsuperscript{178-182}. The ‘classical’ risk factors (serum cholesterol, blood pressure and BMI) were targeted, with an emphasis on smoking, diet, and physical activity.

Most of these studies used a quasi-experimental design involving intervention and comparison communities with the community as the unit of allocation and analysis.
Strategies were multi-component and generally targeted the individual through interpersonal, organisational and community-level activities and programs. The focus was on effecting individual behaviour change through increasing awareness, changing attitudes and skills development. These studies, usually of more than two years, most often five to seven years in duration, all utilised health education and media campaigns, health service interventions, community organisation, and collaboration with industry and businesses, such as grocery stores and restaurants, as strategies to effect behaviour change. The European studies in addition to strategies targeting the individual, incorporated strategies to directly effect environmental level change through policy advocacy. The North Karelia study for example, successfully collaborated with the food industry to modify the fat content of certain food products and introduced restrictions and legislation on smoking and the promotion of tobacco products. Finland also changed its agriculture to more plant-based and less animal-based foods.

Although well funded, generally long term, rigorously designed and evaluated, the studies that followed the North Karelia study mostly yielded results that were less than expected. A pooled analysis of the three large US funded generation programs, (the Pawtucket heart health program, the Minnesota heart health program and the Stanford Five City Project) failed to show intervention effects on risk factors levels. Explanations for these modest effects have been presented in various publications.

Design issues relating to non-randomisation of treatment and comparison communities, unit of sampling (individual vs. community), contamination, exposures too brief in duration, varying nature of the interventions, insufficient reach and intensity of interventions, low participation rates, inadequate capacity to intervene across subgroups, and strong secular trends have all been offered as reasons to explain the lack of strong intervention effect.

The North Karelia study however warrants particular attention. The North Karelia study demonstrated significant improvements in CVD risk factors and behaviours that were not replicated to the same degree in subsequent studies. Whilst contemporaneous studies in the United States focused largely on individual
behaviour change through education efforts at multiple levels of influence, the North Karelia study included a strong legislative, public policy component and involved all segments of the community to achieve desired goals. Over a ten year period daily smoking prevalence in North Karelia reduced by 27% in men and 14% in women and cardiovascular disease mortality decreased for men over a five year period by 22% compared to the reference area\textsuperscript{175}. Significant reductions in serum cholesterol and systolic and diastolic blood pressure and favourable self-reported changes in dietary habits were also reported\textsuperscript{175}. Process evaluation indicated that the success of the North Karelia study was not primarily based on changes in health knowledge and health-related attitudes, but rather on broad ranging community organisation strategies and community participation\textsuperscript{175}. This resulted in changes in normative behaviour occurring without consciously changing knowledge of risk factors.

In comparing the strategies employed in the North Karelia study to subsequent heart health studies, four differentiating features emerge. These features have since been developed in the literature: community readiness for action\textsuperscript{198,199}; modifying social norms through involving lay opinion leaders in permeating ideas and information throughout society\textsuperscript{200}; mobilising community action through cultural pride and identity\textsuperscript{175}, and environmental change through health promoting policy advocacy\textsuperscript{201}. Modelled on the success of the North Karelia study, intensive intervention efforts at the national level in Finland, resulted in a 65% reduction in CVD mortality, a 44% reduction in cancer mortality and a 49% reduction in deaths from all causes, in Finland over a 25 year period, with dietary changes considered to be the most important determinant\textsuperscript{197}.

Merzel and D’Afflitti\textsuperscript{191}, examined the history of the tobacco control movement and HIV/AIDS interventions to promote safe sex practices, to understand the limitations of community-based interventions and behaviour change theory. Similar to the North Karelia study the community-wide tobacco control studies such as the US ASSIST studies departed from the individual approach to behaviour change and used policy-based approaches and local tobacco control coalitions to prevent and reduce tobacco use\textsuperscript{202-204}. The US states that scored higher in the policy capacity area on evaluation, had larger decreases in per capita cigarette consumption\textsuperscript{204}. A later randomised community trial targeted at young people, the Tobacco Policy Options
for Prevention (TPOP) study\textsuperscript{205}, also demonstrated a substantial reduction in smoking prevalence of 28\% and reduced access to tobacco by young people. This occurred through a community organisation effort to mobilise citizens to change ordinances, and retailer policies, practices, and enforcement practices, to reduce youth access to tobacco\textsuperscript{205}.

The HIV projects are comparable to the US community-wide intervention studies in that they were not likely to emphasise policy-level change\textsuperscript{191} as did the tobacco interventions described above. The HIV/AIDS interventions developed strategies based on formative research, and successfully altered social norms through peer leaders engaged in diffusing messages about safe sex through the target population\textsuperscript{191}. There is evidence that in effecting population behavioural change, an essential prerequisite is that social norms related to the behaviour need to change\textsuperscript{206}. An example of this is the significant change in social norms regarding tobacco use in Australia that has enabled strong public support for legislation regarding smoke free public places\textsuperscript{207}.

Despite the 40 or more years of behavioural research, there is no single model of community change or “magic bullet” for community change\textsuperscript{187,191}. The community context, available resources, organisational capacity and other factors determine the most appropriate intervention approach. The earlier community intervention studies however provide important learnings to guide intervention approaches.

Four themes emerge from the literature in relation to the factors that enable environments to support community level change to effect positive health outcomes, which are relevant to this review in considering approaches to nutrition improvement. Firstly, that behaviour is socially produced and maintained\textsuperscript{208} and is open to and reflects historical, social, economic and political influences\textsuperscript{185}. Secondly, that community change is both a process and an outcome of health promotion efforts\textsuperscript{191,209-211}. Thirdly, that the community is the unit of intervention and analysis, and that improvement of the community or organisation is independent of individuals and their behaviour\textsuperscript{211}. Fourthly, the degree of ecological reach affects intervention reach and sustainability\textsuperscript{212}.
**Behaviour positioned within its social context**

Individual behaviour occurs in and reflects its socio-cultural context. In addition, most public health measures that impact on morbidity and mortality are not primarily dependent on voluntary individual behaviour but are largely determined by social policies, economic structures and the socio-political and cultural milieu\(^{60;63}\). The focus on individual lifestyle without consideration of the broader societal influences on individual behaviour and health has led to blaming the individual for the failure to change and given rise to the ideology of victim blaming\(^{213}\).

There has been appropriate concern that community-wide interventions may act to widen inequalities within populations. Settings-based approaches have developed to access the harder-to-reach segments of populations. Green\(^{187}\) refers to the harder-to-reach segments of the populations as those who have not had the resources or education to take advantage of private sector services or products and therefore have not benefited from wider secular trends of health improvement. Settings-based studies most often place emphasis on organisational change and involve people in the planning and implementing of a community change process.

The emerging consensus from the literature is that the dominant individual health promotion approach can no longer suffice and a shift in paradigm to a focus on the social determinants of health and change as a social process is needed\(^{185;191;195}\).

**Community change – a process and an outcome**

Community change is a process of structural, social and organisational change in a community to support health\(^{196;211}\). A number of researchers view the process of community change as an outcome in itself of health promotion where traditionally the focus has been on the health end point. They therefore advocate that efforts should not exclusively focus on outcome measures of effectiveness\(^{208;209}\). This ideological shift from the individual to the environment has resulted in the field of health education having to rethink its role. McLeroy argues that the goals of health education should include, not only changes in health related behaviours and health status, but also changes in capacity of individuals, networks, organisations,
communities and political structures to address health problems\textsuperscript{208,214}. Green and Kreuter\textsuperscript{69} also advocate strongly for health education and view it as being critical in mobilising community support for change as shown with the tobacco control studies described previously. While some researchers are more sceptical about the relationship between level of community participation and program outcomes\textsuperscript{191,215,216}, researchers generally agree that experience has demonstrated that community participation and involvement is critical to community interventions\textsuperscript{190,216}.

\textit{Community as unit of analysis}

If the emphasis is on community change then the community and/or ‘system’ rather than the individual becomes the unit of measurement and analysis\textsuperscript{185}. According to Koepsell\textsuperscript{196}, community level indicators are measures derived from units larger and more aggregated than those at the individual level. Examples of community level “environmental” indicators for diet are grocery store shelf-space measures\textsuperscript{217}, proportion of lower fat/lower sugar options in a take-away outlet or proportion of smoke-free settings in a remote community. The advantage of such indicators is that they can be incorporated into community level surveillance systems. A further advantage is that it diverts attention away from individual unhealthy behaviours to focus on the environment that is enabling or reinforcing the undesirable behaviour. The interest then is not solely focused on whether the individual has quit smoking or is eating more fruit and vegetables but is focused on the “quality of community structures” or the “quality of the organisational environment”\textsuperscript{185}. Community level indicators can also be developed to track and feed-back on community change processes\textsuperscript{218}. Having a reliable monitoring and evaluation system, for continuous monitoring of the change process and ongoing learning was considered important to the success of the North Karelia study\textsuperscript{219}.

\textit{Multiple levels of intervention}

There is some debate as to whether community level approaches, as currently conducted, are conceptually different from or simply another approach to individual-level changes\textsuperscript{195}. This difference rests on the “ecological reach” or definition of
multi-level strategies\textsuperscript{212}. Although community-wide interventions may involve strategies at the individual, group, community and organisational settings level, inevitably these strategies focus on individual-level change. Richard et al\textsuperscript{212} differentiate between intervention ‘level’ (that is the micro-, meso- and macro-levels) and intervention ‘setting’ (such as household, store, school, workplace), and consider the intervention ‘level’ to be more important than the ‘setting’ in defining the ecological character of a program. An intervention may occur within the school setting but may still only be targeting the individual. Whereas an intervention at the school level would be aiming to modify structures within the organisation of which one of the strategies may focus on individual change.

Apart from the North Karelia study, few of the community intervention studies described previously actually aimed to modify features of the environment and societal structures. Many of the strategies were aimed instead at directly influencing the individual through strategies implemented in different settings. For example, consumer education in a store through providing point of sale information, aims to directly influence the behaviour of the consumer in a particular setting. Whereas collaborating with the transport industry to improve the cold chain and prevent food spoilage, or collaborating with community stores to increase turnover of fruit and vegetables are examples of environmental level changes that do not directly target the individual.

Merzel & D’Afflitti\textsuperscript{191} comment that the low number of interventions targeting environmental influences, indicates either that strategies targeting environmental influences are more difficult to implement or that targeting individual change is the prevailing paradigm of health promotion. The interventions that did effect environmental level change such as the North Karelia study\textsuperscript{220} and the ASSIST studies had set policy advocacy as a prime study objective. The interventions that have been successful in achieving policy change however, also emphasised the combined social movement needed to support policy change that resulted from education efforts.
Summary of international literature: approaches enabling creative environments to support community change to prevent chronic disease

In summary, this review of the international literature demonstrates that although we know what to do to prevent chronic disease, there is not a lot understood about how to do it. There is no magic bullet and no one-size fits all. A good understanding of the community is needed to develop appropriate approaches\textsuperscript{219,221}. Green and Kreuter\textsuperscript{69} refer to this as community diagnosis and have developed the PRECEDE-PROCEED model to guide this assessment. Researchers agree that there is much promise in supporting community change to improve health. There is increasing support that the way forward is to explore successful approaches to foster community change\textsuperscript{191}.

To foster change whether it is in the setting of an organisation, household or community, multiple levels of intervention are needed. Environmental change can influence the behaviour of the individual without any intermediary change in knowledge or skill. Social-ecological theory also holds the view that the individual can alter their environment. Mobilising community action through education strategies can help to facilitate and support environmental change. Unless planning to alter a behaviour harmful to society, such as the wearing of seatbelts to prevent motor vehicle accidents or restricting access to illegal substances, people have a right to engage in modifying their own environments. Engaging lay opinion leaders or highly influential people in the community can help facilitate community support as demonstrated with the North Karelia and HIV/AIDS studies.

An approach that fosters change at the community level or organisation level requires indicators that measure change at the same level. As change becomes both a process and an outcome, indicators are needed to monitor and guide the change process. An environmental level indicator in relation to nutrition for example is the amount of store space dedicated to fresh fruit and vegetables. A reliable monitoring and evaluation system is important for continuous monitoring of the change process and ongoing learning\textsuperscript{219}.
2.7.2. Community-based interventions in remote Aboriginal communities: past and current approaches to preventing chronic disease and nutrition improvement

Published reports of community-wide interventions implemented in an Aboriginal Australian context have concentrated on presenting and interpreting the health outcomes of these interventions. Few studies have included comprehensive process evaluation. Rather than focus on the health outcomes of these studies, I have drawn from study reports insights on the rationale for various study approaches, and the perceived challenges, barriers and opportunities for community change.

A landmark case study by O’Dea\textsuperscript{222} among Aboriginal Australians, had important public health implications at the time, as it demonstrated that among people with type 2 diabetes, metabolic abnormalities could be reversed or normalised on returning to a hunter gatherer lifestyle where high levels of physical activity and dietary quality were characteristics of survival. The key messages to emerge from this study and to be reinforced in later studies\textsuperscript{4,53,54,78}, were that adopting a lifestyle similar to a traditional way of life with regular physical activity and good quality diet would be beneficial in guarding against and/or managing diabetes.

Since this study by O’Dea, four consecutive studies with similar implementation frameworks have been conducted, evaluated and published\textsuperscript{3,53,54,86}. These studies have all involved a baseline screening of health status, an intervention period of one to two years involving a mix of strategies, and an impact evaluation. Strategies have focused on improving the food supply and mobilising community members to encourage better food choices and increased levels of physical activity. Two additional studies, the Laramba diabetes project\textsuperscript{55} and the Shepparton Healthy Heart Project\textsuperscript{223} are also included in this review. The Laramba diabetes project\textsuperscript{55} was conducted in a remote community in the NT. As with the four studies described above, it used clinic records rather than a community-wide screening to collect data on health outcomes. The Shepparton Healthy Heart Study\textsuperscript{223} was conducted in a rural Victorian town with a large Aboriginal population. It provides preliminary insights into changing health promotion practice with a focus on environmental level change rather than individual change.
The community-wide intervention projects conducted in northern Australia have all reported significant changes in the food supply through measuring store food turnover\textsuperscript{3,53-55}. These dietary changes however have not always been reflected in improved health outcomes at the community level. McDermott\textsuperscript{3} reported that the very subgroup that positively altered their purchasing practices over a two year intervention period\textsuperscript{143}, were of the same subgroup where a tripling in overweight and obesity prevalence was recorded in an eight year follow up study. However, cholesterol levels fell markedly. This demonstrates that obesity reduction interventions are very challenging, but that cardiovascular risk factors can be changed\textsuperscript{156}.

**The Minjilang study: factors identified as enabling change**

The Minjilang nutrition and health project was initiated after a senior Aboriginal health worker requested nutrition advice on behalf of the adult community members following the premature death of two young men from heart disease. The aim of the Minjilang project was to promote an increased variety of food choice and to motivate community members to alter their dietary habits\textsuperscript{53}. This was achieved through store-based and community-wide strategies among a small population of around 150. Nearly all the adult population participated in a baseline health screening. Participation halved however in a 12 month period by the fifth screening.

This study was successful in improving dietary quality of food available in the store and improving markers of cardiovascular disease risk\textsuperscript{53,224}. After one year of intervention, the community achieved a 30% decrease in the percentage of energy intake from saturated fat and a decrease in the proportion of energy from sugars, together with a 12% decrease in serum cholesterol, significant increases in red blood cell folate levels, and a slight decrease in BMI and improvements in blood pressure. No change was achieved for glucose tolerance\textsuperscript{53}.

A number of enabling factors described in the study report were considered to have provided a foundation for the development of store and community-based interventions. These were community readiness, community capacity to effect change, an established relationship with outside research partners and a stable and a
cohesive community governance structure. Prior to the intervention commencing, the community had successfully dealt with the issue of alcohol misuse within the community, demonstrating their ability to independently address issues of concern. The impact of population size on study outcomes cannot be ignored.

Lee et al⁴,⁵³ identified several intervention components she believed contributed to the success of the intervention. These were: the collection, prompt and three monthly feed-back of screening and intervention results; the employment of community members who were known and trusted by community people; developing the capacity of local employees and community members to undertake screening tests; the valuing of traditional knowledge; and, drawing on cultural mores to promote nutrition and physical activity messages.

A mix of intervention strategies were utilised that involved direct education, organisational change and modification of the environment. Being a small community, it is likely that the intervention dose was adequate and had wide reach.

Three years post intervention, Lee et al⁴ demonstrated that most of the changes in the food supply had been sustained. The turnover of fresh fruit and vegetables and proportion of fruit juice and diet drinks to total drinks sales remained at a higher level than pre intervention. The turnover of sugar however rebounded to pre intervention levels.

According to Lee et al⁴, key to the success of this project was Aboriginal control and ownership of the project. Lee et al⁴ posited that these two elements acted to strengthen community competence and facilitated the fulfilment of self determination, which in turn enabled project success.

The Looma study: factors identified as enabling change

Subsequent community-based intervention studies were modelled on the well publicised success of the Minjilang study. A community-wide screening among Looma community residents in Western Australia demonstrated a high prevalence of diabetes and associated risks⁵⁴. This screening was undertaken on the condition that
the community would undertake an intervention with external assistance (Personal communication, K. O’Dea 2006). Initially a cohort of persons with diabetes or at high risk of diabetes participated in activities that promoted better diet and increased physical activity. Intervention strategies were later expanded to involve the “whole-of-community” through store, school, health centre and community-wide activities. The aim of the intervention was to effect normative change and enabling conditions, through health education strategies and increasing the provision of healthy food and opportunities for physical activity.

An outcome evaluation reported health benefits among the high risk subgroup who self-reported participation in intervention activities. The intervention was not able to halt the secular trend of increasing BMI, particularly among younger people. There was however no change in the prevalence of diabetes. A marked reduction (from 30% to 15%) in hypercholesterolemia prevalence and a reduction in mean plasma homocysteine concentrations were observed. Improved dietary quality in the store (increased turnover of fresh fruit and vegetables) and school canteen (provision of a healthy lunch) was sustained over a four year period. These improvements in dietary quality measured by store-turnover were also associated with improvements in biochemical markers of dietary quality: increases in plasma carotenoids (lutein and zeaxanthin; \(\beta\)-carotene and cryptoxanthin mainly in women).

Elements considered key to the success of the intervention were: commitment and support from the community governing structure (the community council); supportive community level policies; ongoing project evaluation and feed-back of results; multilevel strategies implemented in different community settings, such as diffusion of messages through lay leaders; modifying social norms through role modelling; and structural changes such as employment of sport and recreation officer.

Similarly to Lee et al, Rowley et al concluded that community ownership and control of interventions can be a feasible and effective means of improving health behaviour and selected health outcomes. They advocated for future studies to include a systematic process evaluation to understand better the process of community change, as they had the impression that improved health outcomes may
actually have been related to the process of community change that gave the community a greater sense of control over health.

**Homeland communities, Central Australia: factors identified as enabling change**

A health screening in a number of homeland settlements in Central Australia was conducted in 1988 after the premature death of two young male residents. Interest by homeland members led to the health service implementing an ongoing health promotion strategy. Strategies focused on improving diet and level of physical activity through formal and informal education. Initial project activities were centred on placing type 2 diabetes and lifestyle risk on the agenda of the homeland groups. The baseline survey reported that residents of the two groups adjacent to a store had a higher prevalence of impaired glucose tolerance (IGT) (odds ratio for abnormal glucose tolerance of 2.92; 95% CI 1.51-5.63)\(^7\). Mean BMI however did not differ from the mean BMI of other groups further from the store\(^7\). A seven year follow-up survey post intervention revealed an increase in mean BMI across all groups with a greater increase in BMI observed among residents of the two groups adjacent the store. Despite this increase in BMI across all groups, diabetes prevalence did not change, prevalence of IGT halved and prevalence of hypercholesterolemia and smoking (among men) decreased\(^6\).

These successes were attributed to high levels of community control and participation in intervention activities, the delivery of appropriate and consistent messages\(^225\), the stability of health staff and respect for local culture by health professionals, a long term commitment to health promotion strategy, timely evaluation and feedback, linkages developed between homelands and with the health sector, and policy support from council (such as the employment of a health educator). The marked contrast in the health of these people compared to a more centralised population in Central Australia\(^3,7\) led this group of researchers to conclude that the intervention in the homelands could be more successful because of a greater sense of mastery in the homelands\(^226\).
The Ntaria community study: factors identified as enabling change

An original survey in 1984 among 235 adults (63% of target population) in a centralised community considered to have a “long history of acculturation” reported a high prevalence of obesity (22% for men aged 25 yrs and over, and 51% for women aged 25 yrs and over) and diabetes (16.4% for men over 30 years and 19.2% for women over 30 years)\(^3\). A follow-up study in 1987 confirmed the high prevalence of diabetes (29.6% in those over 35yrs) and overweight and obesity (75% of women over 35 yrs of age and 51% of men over 35 yrs) and concluded that there was “a compelling argument for an intervention program aimed at life-style modification to reduce the risk of NIDDM, CVD, and associated conditions such as obesity”\(^7\) (p 1008). It became clear however on consulting with the community that addressing diabetes was considered secondary to addressing alcohol issues\(^227\).

Knight and Enalanga\(^227\) compiled mortality data from medical records, and reported that from 1970, deaths from injury and accidents rose rapidly and that as many young people died from these than from diabetes and heart disease. Knight and Enalanga commented that community people “expressed a degree of helplessness in addressing both [diabetes and alcohol misuse]”\(^227\) (p 52).

Initial effort therefore was focused on placing diabetes on the community agenda\(^227\). Following this, a five day meeting with community residents planned strategies to combat diabetes. Keen to exhort the successes and feasibility of community-wide interventions in an Aboriginal Australian context, few researchers allude to the challenges as have Knight and Enalanga. In a paper prepared for the National Conference on Aboriginal Nutrition in remote and rural communities in 1991, Knight and Enalanga highlighted the challenges confronted by both researchers and the community in implementing a program focused on diet and physical activity in an environment coping with the ramifications of alcohol misuse. Knight and Enalanga remarked on the community disruption, constant mourning and grief and stated that after a prolonged period to put diabetes on the agenda and not alcohol, “our experience in struggling to reach this stage, having established credibility and some relationships of trust……, has led us to question the value of rigid time frames for such projects” (p 54). The challenge of time became even more apparent after the
death of the “prime project motivator”, and an inevitable waiting period “where the program could only commence again when the community was ready” (p 55).

After a 3 year intervention period in this community, 1988 to 1991, a follow up study in 1995 revealed that community residents were more likely to be obese, diabetic and dyslipidaemic, although there was a significant decrease in mean plasma cholesterol across all ages and in both sexes\textsuperscript{3}. The increase in mean BMI was only observed among young women and men 25 to 34 years of age. In younger women (15 to 24 years) there was a trebling in obesity prevalence and a four- to five-fold increase in diabetes prevalence. This result led the researchers to comment that focusing on diet alone was not sufficient to overcome secular trends of increasing obesity and diabetes and that future intervention efforts, would need to include strategies for increased physical activity\textsuperscript{3}.

Against these results, positive changes in dietary behaviour were reported. Store, school and family level activities targeting young people (aged less than 14 years) resulted in an increase in the provision, marketing and promotion of nutritious foods\textsuperscript{143}. Immediately post intervention, Scrimgeour et al reported a positive intervention effect on the purchasing patterns of young people. There was a reduction in purchases of foods high in fat and/or sugar, and an increase in sandwiches, fruit juice and fresh fruit and vegetable purchases. Purchases of larger sized sweet carbonated drinks increased among the boys, which was thought indicative of the powerful influence of advertising reaching remote Aboriginal Australians. An evaluation of store food orders at baseline and again in 1995 showed a community level decline in saturated fat and sugar intake, fresh fruit and vegetable intake and increases in bread and flour consumption\textsuperscript{3}.

These results raised more questions than they answer. The authors attributed failure of the intervention to prevent increasing obesity and diabetes to broader societal issues of endemic poverty, lack of household refrigeration and inequities in the food supply in terms of food cost, availability and quality. An assessment of changes in diabetes and obesity prevalence and dietary intake four years after completion of a community-wide intervention to alter individual risk for type 2 diabetes and CVD, provides no information regarding the effectiveness of the intervention in the absence
of a process evaluation that documents community level changes in the post-intervention period. Whilst there is no denying that these issues contribute to poor nutrition among Aboriginal Australians in remote Australia, without a systematic process evaluation that provides information on intervention dose, reach, intensity, level of sustainability, community readiness and community action and capacity, comments regarding the effectiveness of the intervention itself cannot be assumed.

The Laramba study: factors identified as enabling and reinforcing change

The Laramba diabetes project\textsuperscript{55} provides insight into the process of developing community capacity to initiate and implement community level health promotion activities. This project aimed to raise awareness among community people about diabetes and associated risk factors and consequences, and improve the management of diabetes through strengthening inter-sectoral linkages within the community, providing opportunities for employment, improving the food supply and level of food production, and mobilising the community. Rather than emphasising community control and ownership, this project emphasised the building of partnerships, employment and training, community leadership and participation, a shared vision and inter-sectoral collaboration. As the project progressed, responsibility for initiating and directing activities shifted from the non-Aboriginal project officer to members of the organising committee. In addition to an increased range of nutritious foods being available through the store pre- and post-intervention, a 65% reduction in sugar turnover, an 81% and 11% increase in turnover of fresh fruit and vegetables respectively and a 175% increase in turnover of low fat tinned meat was reported. Despite an improvement in community people accessing health services, no improvement in biomedical control of diabetes was observed, as measured by an audit of clinical records. In fact the two main challenges reported by Tyrrel et al\textsuperscript{55} related to the inability of health-care providers to participate in a community development approach to health attainment, and secondly to contrasting lay and health professional perspectives of health and illness. Supporting a shift away from a biomedical framework, Tyrell and co-workers\textsuperscript{55} suggested that focusing project evaluation on the ability of a project to influence behaviour, and, the personal, social and environmental influences that shape behaviour and community organisation, would be more appropriate and realistic.
This opinion is supported in the international literature reviewed and presented in Section 2.7.

*The Shepparton study: factors identified as enabling and reinforcing change*

The ‘towards a healthy diet’ phase of the Shepparton Health Heart project\(^\text{223}\) drew from the experience of the large community-based US and European studies. The ‘towards a healthy diet’ was an intensive 3 month sub-component of a 2 year heart health project and was implemented among a rural community of more than 50 000 people in rural Victoria. In contrast to the previous studies, primary emphasis was on promoting public policy initiatives and influencing social norms, rather than changing individual behaviour as a short term project goal. The assumption underpinning the study was that with policy initiatives in place, individual behaviour change would occur beyond the program’s implementation. A complementary two-tiered approach was employed. Two media campaigns with specific messages ‘fruit and veg with every meal’ and ‘flavour without fat’ were mounted alongside three public policy initiatives, the eating places, schools and General Practitioners (GP) subprograms, that aimed to influence organisational practices. Process evaluation employed a quasi-experimental design with a comparison community and measured pre- and post-intervention cognitive and behavioural changes such as intention to change, perceived changes, changes in patterns of food orders using point-of-sale data for targeted food items, and practice and policy changes in the organisation and business settings.

As was expected, this project had a larger organisational impact than an individual effect, although changes in individual perceived self-efficacy and intention to change were reported. The most obvious effect was an increase in the number of fruit dishes offered in food establishments and requests for fruit as reported by proprietors, a decrease in self-reported frequency of eating take-away food, an increase in the proportion of schools implementing comprehensive nutrition policies and a higher number of GPs initiating discussions about weight loss. There were no changes in proportion of full cream milk, butter and saturated margarine sales to total milk and table spread sales, nor did eating place proprietors report an increase in requests for vegetables or low-fat foods. In contrast to the philosophy of community control
subscribed to by the studies described previously, this project appeared to have been externally driven with the co-operation and partnering of local organisations and key individuals.

2.7.3. Summary of literature on community-based interventions in Aboriginal communities in remote Australia: approaches to enable and reinforce to prevent chronic disease and nutrition improvement

Lee et al\textsuperscript{53} and Rowley et al\textsuperscript{54;156} demonstrated that intervening at the community level to modify the food supply in particular, is effective and can result in improved biochemical dietary markers and reductions in CVD risk in particular. Impacting on type 2 diabetes and obesity is more challenging, possibly requiring interventions of longer duration and involving significant environmental change and a focus on prevention of excessive weight gain rather than weight loss.

In population change, the gains may be small and have long lead times. Overlooking the achievements of these studies and the communities involved contributes to a widening gap between research and practice and the perpetuation of a prevailing negative attitude towards the ability of community change to effect health. However it is the primary focus of these studies on evaluating individual behaviour change and health outcomes rather than the process of community change that has contributed to this. The shift to a socio-ecological approach to health promotion needs to be supported by a shift in the ideology of practicing health professionals on remote communities.

Directing resources and effort into outcome evaluations rather than process evaluations has resulted in little available information on intervention strategies, approaches and processes. A major limitation to advancing these community-wide interventions and integrating “learnings” into health promotion practice is that they are posited in a biomedical framework. Theoretical underpinnings of the interventions are not explicit. Elements of interventions considered critical to success have not been well explored. For example, most of the community-based interventions reviewed have emphasised community control and ownership. The meaning of community control and ownership is not defined in the study reports, nor
is the process of achieving this described. The discourse of community control and ownership in this context has perhaps been generated from a post-colonist perspective of self determination and empowerment rather than through evaluation and reflection of its advantages and disadvantages.

Both Tyrell and Dunt who focused on evaluating the change process, emphasised community partnerships and collaborations rather than community ownership and control. Strengthening the capacity of the project committee in the study by Tyrell and co-workers was important in order to steadily shift control of the project to the community to address issues of sustainability. A level of professional input was required to facilitate this process.

In all interventions the store or food establishments were critical settings to focus change for nutrition improvement. All interventions positively impacted on the nutritional quality of the food supply and people’s purchasing and particularly on fruit and sugar sales. The process on how this was achieved suggests a number of enabling factors: creating collaborations and partnerships with food vendors; influencing social norms and mobilising the community through community-wide education strategies; establishing and nurturing community support and commitment to the change process; steadily strengthening the capacity of key community people to take more responsibility in initiating and leading the change process; and attention to providing ongoing feed-back of the change process to community. Although not developed in the literature, community support seemed to involve policy support and commitment from the community Council and creating and maintaining linkages with the health centre and other community organisations.

Providing feed-back to the community pre- and post- intervention and at various times throughout the intervention was identified as an enabler to the change process. The structure or frequency of this feed-back is not described in the literature. Feedback occurred at the individual and community level and generally included individual clinical results, community level results on disease risk and risk conditions, and changes in the nutritional quality of the store food supply.
2.8. Conclusion

Factors influencing nutrition and nutrition improvement of Aboriginal people living in remote communities of the NT are identified in the literature. There is however little supporting research into these factors and their impact on nutrition. A better understanding of the factors influencing nutrition and nutrition improvement is required to inform the development of appropriate policies and strategies for nutrition improvement. This aim of this thesis is to contribute to this understanding.

There is evidence that intervening at the community and store organisation level can positively influence nutrition improvement in Aboriginal communities in remote areas. The process of how to achieve this is not clear. Past approaches have identified elements considered critical to enabling community level change. These elements have not been adequately examined in the context of Australian Aboriginal health but are supported in the international literature. Experience from community intervention studies, implemented in Australia and overseas, calls for a socio-ecological approach to health improvement.

The store in remote communities provides an ideal setting to gain an understanding within a socio-ecological framework of the enablers and barriers to change and nutrition improvement. This understanding is particularly important considering the focus on remote community stores as an intervention point and the success demonstrated when supporting stores to enable nutrition improvement. Without this understanding success stories become isolated events associated with one community interventions. Through a case study of the store, an aim of this thesis is to determine how store practices influence the nutritional quality of the food supply and to propose an approach for wider nutrition improvement in stores in Aboriginal communities in remote areas of Australia.
A framework for the research approach and principal methods used
Chapter 3. Research context and research approach

3.1. Research site and study context

Figure 3.1 The Top End of the Northern Territory, with arrow indicating Galiwin’ku (the light yellow areas indicate Aboriginal land)

3.1.1. Location and demographics

This research was conducted with the Galiwin’ku community. Figure 3.1 shows the location of the community in respect to Darwin, the capital of the NT. Galiwin’ku is an Aboriginal community located on Elcho Island in North-East Arnhem Land in the NT. It is approximately 550 km north-east of Darwin and 150 km north-west of the nearest urban centre, Nhulunbuy, which is a mining town with a population of 3755. Galiwin’ku is a Yolngu word meaning: the side of the island where the parrotfish are, and denotes the land on which the township has been established. It has an all weather airstrip and is accessible by light aircraft and sea vessel. There is a weekly
barge service and once daily flights from Darwin. Two air charter services operate from Galiwin’ku. The Aboriginal people of North East Arnhem Land have free hold title of their land under the Commonwealth Aboriginal Land Rights (NT) Act 1976. A permit is required through the Northern Land Council to enter Aboriginal land under the Aboriginal Land Act.

Galiwin’ku is the largest community in North East Arnhem Land with a centralised population that fluctuates between 1500 to over 2000. Galiwin’ku has always been considered a large remote community. Almost half (46.9%) of the population are under 19 years of age. In 2001, the population growth rate was estimated at 2.25%. Alcohol is prohibited.

3.1.2. Climate and seasons

The top end of the NT has a tropical monsoonal climate with two major seasons, “the wet” from November to March, and “the dry” from May to September. Tropical cyclones occur during the wet monsoonal season. Yolngu recognize six seasons that determine hunting and gathering, and ceremonial activities.

3.1.3. People and country

The people of North East Arnhem Land are Yolngu and are related through a complex kinship system. All living and non-living aspects of the natural environment are classified in two moieties, Dhuwa and Yirritja. The people belong to sixteen subsections of a social network that sustains the division between the two moieties and is used to trace connectedness to other people. Over twenty language groups are represented at Galiwin’ku community. Djambarrpungu is the dominant language group. English is generally spoken as a fourth or fifth language. The Yolngu of North East Arnhem Land, which covers an area of over 37 000 square

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1 Due to the mobility of the population, it is difficult to accurately estimate the community population. The Community Health Centre in May 2006 had 2995 Aboriginal and Torres Strait Islander people on the Health Patient Database. This includes people who have attended the health centre but may not be resident in the community.
kilometres, live in nine centralised communities and over ninety homelands. There are 28 homelands that are serviced by the Marthakal Resource Centre which is situated in Galiwin’ku community. These homelands rely on other services available in Galiwin’ku, such as the store. A number of the homelands are on Elcho Island and are accessible by road from Galiwin’ku during the dry season and for some of the wet season.

While the people of Galiwin’ku are kin, only specific language groups have ancestral rights to the land on which the township has been developed. The leaders of these language groups are referred to as the traditional land owners (TLOs). The TLOs exert considerable influence in the distribution of resources in a community. Yolngu are connected to their ancestral land, spiritually, emotionally and physically, as they are to every natural feature in their environment. The population is very mobile as people move between the community and surrounding homelands or other communities to maintain strong relationships with land and family.

**3.1.4. Community Governance**

Galiwin’ku is governed by an incorporated council which comprises two representatives resident in Galiwin’ku, from each of eleven language groups. The council is administered by a Chief Executive Officer and Council Chair and derives powers and duties from the Northern Territory Local Government Act230. Mala [language group] leaders have a significant role in the governance of the community. Traditional structures of authority, although not readily visible, are active in the community.

**3.1.5. Education**

Ceremony is an integral part of people’s lives. Learning continues to occur within a traditional framework where knowledge is passed on and maintained through traditional songs, stories, dances and designs.
Young people are also educated through the western education system. The community school comprises a pre-school where children are encouraged to attend from the age of 5; and a junior, middle and senior secondary school. A senior secondary school commenced in 2004. Three students graduated in 2005 having completed their Northern Territory Certificate of Education. Poor school attendance is an ongoing issue in remote communities in the NT. School attendance in Galiwin’ku community is estimated to vary between 50% to 65% of total enrolments with an estimated 1% attending 95% or more of the school year (Personal communication, Shepherdson College Principal 2006).

3.1.6. Employment

There are 167 permanent part-time and full-time non-CDEP positions in the community, 60 of which are filled by non-Aboriginal people. There are 180 CDEP positions in the community. CDEP employees are expected to work a 3.5 hour day, 35 hour fortnight. The base rate for CDEP is $13.00 per hour. Government project funding employs some people on CDEP for a number of “top-up” hours in addition to the normal CDEP hours, at a negotiated hourly rate. The store, council, school and health centre are the main community departments providing employment other than CDEP. The community store employs 40 of the non-CDEP personnel. The community hygiene service, environmental health program, women’s program, landscaping program, civil works program, and child care program, are CDEP supported programs.

3.1.7. Housing

Households are physically located in the community according to the language group of which they belong, although this is not an intentional council design. Many of the Warramiri people for example live on their Grandmother’s land which is the “beach camp” area of the community. To illustrate the issue of housing in remote Aboriginal communities, the Galiwin’ku council estimates a shortage of 192 three bedroom houses to adequately accommodate the population. Multiple family groups
live together in some households with many young children. In this situation family groups normally share a bedroom in the house. The Council Incorporated housing department is responsible for house maintenance and repairs.

3.1.8. Services

As in most remote communities there is a women’s centre, arts centre, child care centre, environmental health program, a youth and program and a community education centre. There is also a bible translation centre and a Christian church. The community health centre, Ngalkanbuy Health, is a community managed organisation. It employs one resident medical doctor, 5 non-Aboriginal registered nurses, 6 Aboriginal health workers and a number of ancillary staff. A community aged-care program, a meals-on-wheels service for the aged and people with disabilities, a “Strong Women, Strong Babies, Strong Culture” program and a renal dialysis unit are also managed by the health centre. A host of government services are provided through visiting personnel, such as visiting nutritionists, dentists, physicians, trainer providers and other allied health professionals.

3.1.9. Yalu’Marnggithinyaraw: an Indigenous community-based organisation

The Yalu’ Marnggithinyaraw nurturing centre is an Indigenous community organization funded by the Australian government Department of Families, Community Services and Indigenous Affairs, with the mandate of improving the health and wellbeing of community residents through maintaining and strengthening Yolngu families. Yalu’ means a nest/birthplace: Marnggithinyaraw means to be learning. Yalu’Marnggithinyaraw is therefore a place where learning is nurtured. Yalu’ Marnggithinyaraw is involved in community development type of activities and community-based research. The central focus of this organization is to re-establish Yolngu systems of education and health for improved community well-being. The locale of Yalu’Marnggithinyaraw also provides a culturally safe physical space for socialisation, discussion and counsel.
3.1.10. The Community food supply

A community store, a store take-away, two privately owned take-aways and a school canteen provide the main food source. There is also a council store that sells cold drinks in addition to household goods and hardware. Purchased food is supplemented by traditional foods which are available in the surrounding seas, rainforests, freshwater areas, mangroves and bush.

The closest houses to the store are immediately adjacent whilst the houses furtherest from the store are about one kilometre in distance. One of the two privately owned take-away outlets is no more than 100 metres from the store. There is an intermittent community bus service where for $2/head, people can be transported to the store to do their shopping.

The store operates from 9am to 5pm on week days and 9am to 12 midday on Saturdays and the store and privately owned take-away outlets from 9am to 10pm daily. The store and store take-away close intermittently on advice from the store liaison officer in relation to funerals or other significant community events. The store is occasionally cursed. Once cursed, the store is closed immediately and will not re-open until ceremony has been performed to lift the curse.

In addition to food lines, the store carries limited clothing, household and personal cleaning products, household equipment and cooking utensils, toys, and other merchandise. Wednesday and Thursday of each week are the busiest days for the store and take-way coinciding with pay days. The store has 4 check outs, all with scanning equipment and Eftpos machines.

3.1.11. Freight service

All goods from food items to motor vehicles are imported. Goods arrive weekly by a barge that operates between Darwin and Nhulunbuy, and services the communities in between. There is a single barge operator for Arnhemland. The barge sails from
Darwin on the Friday night of each week and arrives at Galiwin’ku either on the Tuesday or Wednesday of each week depending on the tide.

Produce is unloaded at the “barge landing” about ten kilometres from the town centre. Containers belonging to the store are fork lifted onto the store truck and delivered by gravel road to the store. Delivery of food is normally only affected by extreme weather such as in the event of a cyclone which occurred in both 2005 and 2006. Fresh produce however such as fruit and vegetables sometimes arrives damaged. This is likely to occur when produce is delivered to the shipping yards and is not immediately refrigerated or there is a delay in refrigerating produce on arrival at the store. Most non-Aboriginal people receive a freight subsidy through their employment and order their food independently to the store.

3.1.12. Arnhem Land Progress Association (ALPA)

The community store is one of the five member stores of the Arnhemland Progress Association (ALPA). ALPA also provides a retail consultancy service, currently managing 11 additional stores to the 5 member stores. ALPA was established in 1972 and is an Aboriginal owned benevolent organization. The mission of ALPA is to “conduct an efficient retail business emphasizing customer service, nutrition, staff development, training and education”\(^{231}\). ALPA is one of the largest financially independent Indigenous employers in Australia and the third largest retailer in the NT\(^{231}\). The 2005 turnover for ALPA was $29 million\(^{231}\). The Galiwin’ku store has an annual turnover of around $2.5 million.

ALPA is managed by a board of directors with each member community having two board representatives; a traditional land owner representative and the community council’s chairperson. The current chair of the board of directors resides at Galiwin’ku community as does the ALPA liaison officer.

Responsible to the ALPA General Manager (GM) is a management team that supports the store managers. The ALPA board meets quarterly and meetings are alternately held in member communities. Each member community in principle has
a store committee. The role of the store committee is to support the store employees to resolve local issues in relation to the store, to serve as a conduit for feedback from the community in regards to store matters and to control the community dividends. Previously the different language groups represented in the community received dividend funds as a Christmas payment. Dividend funds are now used to support approved community projects and activities such as funerals, ceremonies, education assistance and sporting events. ALPA re-launched its health and nutrition strategy in early 2005.

Community residents refer to the Galiwin’ku store as the Walakuy store as this is the name of the land where the store is situated. ALPA has a land use agreement with the traditional land owners of Galiwin’ku, the TLOs of the land where the store is, and with the TLOs of the barge landing. This agreement is managed by the Northern Lands Council (NLC).
3.2. Research Approach

3.2.1. Research in an Indigenous context

Research with Aboriginal people and communities has often been undertaken with the view of Aboriginal people as the research subjects rather than as active partners in the research process. The research process, including the design, collection of information and sharing of knowledge is often controlled by researchers external to the community. Aboriginal people have not always been satisfied with this approach nor have they always felt the benefits of the research. This experience has resulted in many Aboriginal people and communities being wary of research and reticent to participate.

These concerns of both Aboriginal people and the research community, about unsatisfactory research processes including poor consultation, lack of communication and infringement of deeply held values arising from cross-cultural insensitivity, has led to the development of guidelines for the ethical conduct of Aboriginal and Torres Strait Islander health research based on the principle of respecting the values and principles deeply and firmly embedded in Aboriginal culture.

Underpinning these guidelines is the notion of differences in world views: how people see the world is generally informed by their own experiences, values, norms and experiences. It is by recognizing and embracing differences that the research process can be enriched and become meaningful for those involved. “Within the research process, failing to understand difference in values and culture may be a reckless act that jeopardizes both the ethics and quality of research” (p 3).

The Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research recognize that the combination of two world views in a research process is not straightforward and “takes time, care, patience and the building of robust relationships” (p 3). It is the building of these relationships based on trust that enable research to be sustained within an Aboriginal and Torres Strait Islander context.
The six values as shown in Figure 3.2, expressed in the Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research, formed the research framework for conducting the present research.

**Figure 3.2 Aboriginal and Torres Strait Islander Peoples values relevant to health research ethics**

Contributing further to this research framework is the Yolngu concept of “ralmanapanmirr” which has informed the present research approach together with the six values presented in Figure 3.2. Embracing the concept “ralmanapanmirr” as well as ensuring that the research process is conducted in the spirit of integrity, trust and respect, requires a shared vision and the spirit of collaboration between all people concerned.

### 3.2.2. Applying the seven values to the research process

**Spirit and integrity**

There are two components to the value of spirit and integrity: that the motivation and action of the research respects the community’s cultural, spiritual and social cohesion
of the past, current and future generations; and that the research intent and process is honest, ethical and in keeping with the other 5 values.

Central in guiding the research process described in this thesis was the community organization Yalu’ Marnnggithinyaraw (Yalu’). Yalu’ Marnnggithinyaraw, which extends beyond the people directly employed by Yalu’, to the different people that associate with Yalu’ and become involved in various discussions and projects, guided the research to ensure its integrity, rigour, and respect of cultural values and principles.

Two community members and Indigenous researchers, Elaine Lawurrpa Mayilama (EM) and Joanne Garnggulkpuy Dhurrkay (JG) were my mentors throughout the research. These two researchers together with other members of Yalu’ Marnnggithinyaraw provided support, expertise, cultural guidance, and sanctioned the research among community members. EM and another member of Yalu’ Marnnggithinyaraw, Dorothy Yunggirrnga Bukulatjpi (DY), were employed for periods of the study as co-researchers and continued to mentor me throughout the study. Yalu’ provided not only office space but a space to discuss the study with other members of the community. The views, concerns and interests of community people informed the research process. Within this space or under the trees or on the beach, the research process was negotiated: - who I could interview as key informants, time frames, appropriate questions to ask, suitability of methods and tools, pre-testing of study instruments and interpretation of insights emerging from the study.

Field work was conducted over extended periods of time in the community so as to “fit in” with community everyday life and to minimize disrupting the cultural and social commitments and other obligations that people had. This required that a very flexible approach be taken that alleviated the pressure on both myself and the community to “get the research done” and viewed every moment as contributing to a better understanding of differences in world views, knowing, seeing and doing. The research approach also required trust and patience in knowing that as the research was supported by Yalu’ and the community, assistance would be provided secondary to other family, community and workplace issues and events.
The understanding that the present is bound in the past and the future, and that these cannot be separated from each other guided this research to gain an understanding of the past influences on nutrition in relation to present behaviour. An historical review of past practices in relation to contemporary nutrition was an important study component of this research.

**Reciprocity**

Reciprocity in the research context involves the consideration of two main components: inclusion and benefit. Inclusion refers to the degree of equitable and respectful engagement with the research community. Benefit describes the return to the community that is valued and advances the interests of the research community.

This research developed in response to the community’s expressed concern about the social and cultural consequences of chronic disease, mainly type 2 diabetes and renal disease. Diet is associated with these diseases and concerns about the quality and cost of the food supply were expressed. The aim of this research was to determine the magnitude of type 2 diabetes and related conditions and to better understand the factors influencing nutrition so as to inform the development of more appropriate strategies and government policies for the community and for remote communities.

Yalu’ Marnggithinyaraw and the Community Council have both expressed the need for research to be embedded in the community and be acted on. This informed the development of the second part of this research which was to feedback the knowledge and insights gained from the exploratory part of the study to inform a process of community change. The “action” part of research as interpreted by Yalu’ Marnggithinyaraw comprises more than the employment of people and the strengthening of research capacity within the community. It infers the contribution of “making a difference” in redressing the inequities experienced by Aboriginal people.

It was in the spirit of reciprocity that the study components of this research relating to the store were developed with the intention of contributing to nutrition improvement in remote stores and more broadly across the NT. In addressing the
action part of this research, we learnt from and informed the development of a community development process to improve nutrition, health and well-being through the local production of food, intersectoral collaboration and community education.

The intent for “action” strongly expressed by the study community, has led Menzies School of Health Research (MSHR), the research institution supporting this research, to make a long-term commitment to supporting the Galiwin’ku community in research and social action.

Respect

There are two main components relevant to the value of respect in a research context. These are acknowledging and affirming the right of people to have different values, norms and aspirations; and recognizing the contribution of others and the consequences of the research.

Throughout the conduct of the research the development and maintenance of respectful relationships received as much attention as the scientific rigour of the research. These two elements were considered inseparable. Yalu’ Marnggithinyaraw oversaw the detail of the research on who should be consulted, who would be engaged in the research and how these people would be engaged. This was partly based on the need to respect cultural relationships and traditional authority structures so as to minimize adverse research consequences. It was also based on respecting Yalu’ Marngginthinyaraw as an Aboriginal research organisation with the knowledge and expertise to consult appropriately and fairly with people. Drawing on the expertise of Yalu’ and being flexible in the research approach ensured the use of methods appropriate to the cultural context.

Richness is in the diversity of different views and ways of seeing the world. It was this richness that this research endeavoured to capture through engaging with people in the community, both young and old. A mixed method approach was used to capture this richness. Capturing this richness also required interviewing older people in particular, in the language with which they were most comfortable.
In conducting this research I respected the knowledge, understandings and insights gained from the research journey, which resulted from the input and contribution of many people, and belongs to the collective. The purpose of this research is to make these understandings available to other people while acknowledging the contribution of the collective.

*Equality*

Equality in the research context is about valuing knowledge and wisdom, equality of partners and the distribution of benefit. Historically Aboriginal people have perceived the researcher and institutions to principally benefit from the research. This research is underpinned by a strengths-based approach and embraces the values and ethics of Aboriginal society. It values the knowledge and wisdom of people in the community and has sought this knowledge and wisdom to guide the study and ensure its integrity. Yalu’ provided me with a lens through which to observe their world and taught me how to see through this lens. Having the responsibility for this lens is based on trust, built over time as a result of many small interactions and encounters that go beyond the scientific conduct of the research.

Concerns relating to the research have been openly discussed with Yalu’ Maringithinyaraw. Throughout the research period, Yalu’ and I have constantly reflected on the research and where there has been concern we have endeavoured to consult with the appropriate people.

The perceived equitable distribution of benefit influenced the different methods used for data collection. For example, at the household level cooking and sharing food as part of the information exchange was perceived by people in households a more equitable distribution of benefit than information collection alone. Even at the individual level, people were very contemplative of the meaning and benefit of the researcher-researched interaction and expected more from the encounter than them presenting their views only.
As expressed by EM:

Yolngu are thinking, what is the story that this person brings for me? What is this person telling me and what meaning is there in this story for me?

Bishop observes in reference to ‘a Kauapapa Maori’ approach to research that “…the “personal investment” by the researcher is not an act by an individual agent but instead emerges out of the context within which the research is constituted”\(^{233}\) (p 118). As an outsider to the community, I represented access to external resources and to wider networks. I also presented as someone who appreciated differences, was open to learning, was empathetic in relation to people’s circumstances, and was committed to support people. In return, people in the community facilitated my research, gave friendship, and shared their knowledge and insights with me. It was within this relationship of reciprocation that my role in the community was negotiated. Days of field work were spent assisting with administrative type tasks for Yalu’ Marnngithinyaraw, helping to organise equipment repairs, participating in community meetings, clarifying printed material, helping with internet banking, and assisting people at a personal level.

**Responsibility**

When engaging Aboriginal and Torres Strait Islanders in the research enterprise, researchers carry responsibilities in addition to the science of their inquiry. The nexus between their research and community life brings responsibilities for which they or those of the community with whom they work may be held accountable. Ethical research occurs when harmony between the sets of responsibilities is established, participants are protected, trust is maintained and accountability is clear\(^{65}\) (p 16).

In the research context the following two components of the value of responsibility need to be considered: doing no harm and accountability.

This research has been a journey where there was no quick entry and there is no quick exit. There is a contract of responsibility, both cultural responsibility and
research responsibility. In years prior to the present study, I had been adopted into the Yolngu kinship and since 2001 have developed a close working relationship with Yalu’Marnnggithinyaraw. I undertook this study together with Yalu’ Marnnggithinyaraw in the role of student, colleague and adopted kin. As an adopted kin, there were responsibilities and commitments that I was expected to observe throughout the research process and continue to do so.

There is a responsibility with this research that the perspectives of Aboriginal people on eating behaviour and nutrition improvement from a historical and contemporary stance fairly represent the Aboriginal people of Galiwin’ku. Misrepresentation of Aboriginal people would contribute to wrongly formed assumptions about Aboriginal people and would be an encroachment of the trust given to me to undertake this research. Misrepresentation can occur through misinterpretation of meaning. Ensuring that this does not occur is particularly challenging as people often use metaphors in their stories, conversations and interviews that can have multiple meanings depending on the context of the story, the relationship between the story-teller and receiver, and the spiritual beliefs and the language group of the story-teller. A further concern in relation to misinterpretation was that my Yolngu language skills were extremely limited. There are few non-Aboriginal people that are fluent in the Yolngu languages.

To minimize misinterpretation, interviews were conducted in the language that the respondent felt most comfortable with. Interviews in language were facilitated by EM and for the school focus groups by DY. On completion of each of the interviews and the school focus groups, the interviews were played back, orally translated, and the meanings discussed. All interviews were transcribed and translated. Themes that emerged as the research developed were tested in conversations with people, through participant observation and through further inquiry.

It was through intense and prolonged engagement with people in one community, that the perspectives of people were explored. The use of mixed methods was important in the research context to validate the interpretations of data. The key findings of this thesis have been discussed with key community members.
As described by Bishop\textsuperscript{233} in reference to ‘a Kauapapa Maori’ approach to research, and similarly in this study community, the research is not able to proceed unless: support is obtained from the community council and influential members; unless respected leaders provide guidance; and unless there is mutual respect and a level of tolerance exercised between the participants and researcher. As an adopted kin, I have been guided through this research to continually honour relationships, be respectful of differences and respect the notion of reciprocity. The relationship I have with people in the community defines who I am and how I relate to and communicate with people.

The following is an excerpt from my field notes after a conversation with Elaine Maypilama on the meaning of a research relationship:

A researcher is someone who is prepared to eat, sleep and live with Yolngu. There is an exchange that needs to take place at the individual level, where Yolngu is in the Balanda [Balanda is the Yolngu term for non-Aboriginal person] blood and the Balanda is in the Yolngu blood. There is a trusting friendship/relationship that is formed. The crux of this is that you need to be prepared to go beyond the boundaries of your work, you enter a relationship with responsibilities and obligations where the experience is enriched and there is an exchange where Yolngu work together with the Balanda and the Balanda is a resource to the Balanda world. Together, the Balanda and Aboriginal person are finding a way to work together, try to resolve problems, together talking things through, trying to understand both ways, remembering that there are strengths within communities that need to be valued and traditional mechanisms that work within (Personal communication, Elaine Maypilama 2004).

\textit{Survival and protection}

The repeated marginalization of Aboriginal people’s values in research has created barriers where researchers need to make particular effort to deal with the perception of many Aboriginal people of research as an exploitative exercise\textsuperscript{65}. The guidelines distinguish three components that need to be considered in research: importance of values based solidarity, respect for social cohesion and commitment to cultural distinctiveness.
3.2.3. Ralmanapanmirr: A participatory research approach

Ralmanapanmirr is the seventh value that has formed the framework to guide the research approach. Ralmanapanmirr is a very complex word that denotes the concepts of collaboration, co-operation, sharing, motivation, and sharing a goal. Embracing the concept of ralmanapanmirr requires that research is a shared responsibility and collaborative process to achieve a shared goal. In this respect it relates to a participatory research approach.

Community-based participatory research as defined by Israel and co-workers⁶⁴ is the research process where:

The partners contribute unique strengths and shared responsibilities to enhance understanding of a given phenomenon and the social and cultural dynamics of the community, and integrate the knowledge gained with action to improve the health and well-being of community members

Participatory research begins with the assumption that communities can and must benefit from research, it requires reciprocity and a commitment to action²⁵⁵. Israel and co-workers⁶⁴ (p 55-58) have developed nine principles that seek to capture the key elements of community-based participatory research (CBPR).

These are that CBPR:
- Recognises community as a unit of identity
- Builds on strengths and resources within the community
- Facilitates collaborative, equitable partnership in all phases of the research
- Promotes co-learning and capacity building among all partners
- Integrates and achieves a balance between research and action for the mutual benefit of all partners
- Emphasizes local relevance of public health problems and ecological perspectives that recognize and attend to the multiple determinants of health and disease
- Involves systems development through a cyclical and iterative process
Disseminates findings and knowledge gained to all partners in the dissemination process

Involves a long term process and commitment

These principles of participatory research link the Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research, the Yolngu concept of ralmanapanmirr, and systems/socio-ecological theory.

Based on this framework, the present study featured a participatory process using mixed methods of inquiry, gaining insight, feeding-back into a process of community action, further study development and inquiry.

EM made the following comment about the research approach:

…..it is like a tree going deeper or a cave, exploring the different parts, finding the light. Research being done in the past by anthropologists, people living with and eating with Yolngu. Now coming and staying for 2 or 3 or 4 weeks and keeping coming back until have the full story. This is like a ceremony where you will walk in and your eyes are opened….Oh! this is what it is all about, as you learn new knowledge and see new things. You will keep going through this ceremony until you learn and really know…… This is what this research is about, going in, seeing, experiencing until you have the full story and understanding.

3.3. Ethical clearance for the study

Ethical clearance for the community-based intervention study (the epidemiological assessment phase) was received in 2000. I received ethical clearances to conduct the other phases of the study from the Human Research Ethics Committee, NT Department of Health and Community Services and Menzies School of Health Research (Ref. 03/01; 03/01-2) and the Charles Darwin University Human Research Ethics Committee (Ref no. H03043). Written support was provided by the Galiwin’ku Community Incorporated. Clearance was provided by the Arnhemland Progress Association and the take-away proprietor to conduct field work and participatory observations. Ethics clearance to conduct the second part of phase
three, which involved a study with young people in the community school, was obtained from the NT Department of Education Employment and Training, the Human Research Ethics Committee, NT Department of Health and Community Services and Menzies School of Health Research. Permission was granted by the Shepherdsen College Principal.
Phase 1: An epidemiological assessment of nutrition
Chapter 4. Nutrition related conditions and contributing factors

This chapter presents a community-based health screening to address the research question: What is the magnitude of type 2 diabetes and related conditions including poor diet among the study population? It focuses on overweight and obesity as a risk condition and describes the pattern of body fat distribution in the study population. Several dietary behaviours were examined.

4.1. Introduction

A community-based intervention study in which the present research was nested commenced in 2001 after MSHR researchers (including the author) were invited by the study community to discuss a collaboration to reduce the risk of type 2 diabetes and related conditions. This was initiated by the community health centre which had identified type 2 diabetes and renal disease as priority areas. Community people expressed concern about the social and cultural ramifications of the rising prevalence of chronic disease among their kin and the number of people having to live permanently in Darwin for renal dialysis. The community agreed to support a community-wide screening to determine the prevalence of type 2 diabetes and related conditions and committed to work with the research team to support community level change to address preventable chronic disease.

This community health screening is a component of phase 1 of this research which involved an epidemiological and behavioural assessment of nutrition. The findings from this health screening were used to stimulate awareness and dialogue in the community about preventable chronic disease and appropriate action, and provided direction for the subsequent phases of this research.
4.2. Aim

The broad aim of the study was to determine the prevalence of diabetes, related conditions and associated behaviours among people aged 15 years and over in the study community by undertaking a comprehensive health screening.

4.3. Method

4.3.1. Screening procedures and participation

A health screening of residents aged 15 years and older was conducted in August-September 2001 and February-March 2002. A health questionnaire was administered by local interviewers to those who consented, between the two screening periods. These participants received a hand-delivered personal invitation to attend the second screening if they had not already participated in the first screening. All adults 15 years of age and over and residing in the study community were eligible to participate.

As described elsewhere, an extensive course of consultation occurred prior to and during the screening procedures\textsuperscript{236}. A committee was formed to plan and organize the community-wide screening. Community members and groups had input into research activities, including the format and content of questionnaires, and administration of questionnaires in local language. The health questionnaire was modified by the committee after the first screening round to reduce its size and therefore time required for administration. Community involvement also ensured that the implementation of the screening was respectful of and did not violate any cultural protocols. Local health workers and research assistants were employed and trained to assist with the screening. Other community members such as Yalu’ Marnggithinyaraw contributed in-kind to assist with organizing the screening, translating the consent forms, preparing tea and sandwiches, and administering consent forms and screening questionnaires.
The screening was advertised using local radio, community broadcasts, through Mala (language group) leaders, information leaflets, posters, a project video, meetings, and house to house invitations.

### 4.3.2. Health screening

The full protocol for the health screening included the collection of a) fasting blood and urine samples, b) blood pressure measurements, c) anthropometric measurements and d) a health questionnaire administered either at people’s homes by a local research team between the two screening periods or at the same time as the collection of biological and anthropometric measures. Results from the collection of fasting blood samples, anthropometric measurements and diet-related questions from the health questionnaire are reported in this chapter.

### Measurements

All fasting blood samples were collected at the health centre, between 7.30am and 12 midday. Anthropometric measurements were either carried out at the health centre or at people’s work places in a private area. The collection of blood samples and anthropometric measurements occurred at least within one day of each other.

Venipuncture was performed after an overnight fast and blood drawn directly into two vacutainers containing fluoride and lithium heparin. Tubes were immediately placed on ice and centrifuged within 4 hours. Aliquots of separated plasma were stored in liquid nitrogen (‘Biological Shipper’ CryoPak Series, Taylor-Wharton, AL, USA) for transport. Samples were analysed at Flinders Medical Centre, (Adelaide, South Australia) in a laboratory accredited in the U.S CDC Lipid Standardisation Program. Glucose was analysed on a Hitachi 917 analyser and insulin by immunoassay (Abbott Axsym).

Body weight was recorded to the nearest 0.1kg (using a digital portable scale) and height to the nearest 0.1cm using a wall mounted stadiometer.
The health questionnaire was administered to collect behavioural risk factor information relating to diabetes and related conditions. Four questions reported elsewhere, related to diet and one to physical activity. Three questions collected information on the frequency of traditional food, fruit, vegetable, and take-away food consumption for the four weeks preceding the study. Response scales for fruit and vegetable consumption and traditional food and take-away food, assessed separately, were: 0-1 times/week; 2-3 times/week; 4-6 times/week (most days); and everyday. The fourth question was open ended and collected information on constraints to consuming more fruit and vegetables. Response scales for physical activity were: none; 1-2 times/week; 3-4 times/week; and >4 times/week.

These measures were based on questions used earlier for surveys in other Aboriginal Australian communities and were considered relevant and culturally safe by the study committee.

**Ethics Approval and consent**

The protocol was approved by the Joint Human Research Ethics Committee of the Northern Territory Department of Health and Community Services and Menzies School of Health Research, Darwin. The Community Council endorsed the study in June 2001. Information about the study procedures was provided verbally to participants by local health workers and by video showing screening procedures and sample handling details. Consent forms were generally administered in language, and each part of the survey could be consented to or refused. Participants gave written consent. Participants were given a copy of their own results and a personalised explanation. A series of workshops were conducted with the community council to discuss research findings and appropriate action.

**4.3.3. Statistical Analysis**

Diabetes was classified as present if there was a previous diagnosis of diabetes (confirmed from medical record) or a fasting blood glucose ≥7.0mmol/L. HbA1c was also measured and used to confirm diabetes. Using these criteria, 4
people with a fasting blood glucose ≥7.0mmol/L but an HbA1c <6% were classified as non-diabetic. Impaired fasting glucose was defined as fasting blood glucose ≥6.1-<7.0mmol/L\(^2\) \(^3\) \(^8\). HOMA, an insulin resistance score based on fasting glucose and insulin concentrations\(^2\) \(^4\) \(^1\) \([\text{HOMA1} = (\text{FPI} \times \text{FPG})/22.5; \text{where FPI is fasting plasma insulin concentration (mU/l) and FPG is fasting plasma glucose (mmol/l})]\) was calculated for non-pregnant and non-diabetic participants. BMI was divided into five categories: <18, 18-<22, 22-<25, 25-<30 (overweight) and ≥30kg/m\(^2\) (obese) and further re-grouped as lean (BMI<22kg/m\(^2\)) or not overweight (BMI<25kg/m\(^2\))\(^7\) \(^6\). Age was categorised into five groups: 15-24, 25-34, 35-44, 45-54, and 55+ years.

A house-to-house census of community residents aged 15 years and over was conducted in April 2002. The age and sex structures in the 2002 house-to-house census and the study population were compared using chi-squared to examine the representativeness of the sample.

Responses to diet-related questions were analysed as a function of age and sex. Age was categorised into five age-groups as above, up to 55+ years. Age and sex differences for each of the variables were tested for significance using chi-squared. Responses to the four-category ordinal scales for consumption frequency were collapsed into two levels; 0-1 times/week and >1 times/week. For physical activity, responses were collapsed to 0-2 times/week and >2 times/week.

Logistic regression was used to examine the association between BMI and diabetes or dichotomised HOMA score after adjusting for age. In these analyses the two younger age groups were combined because there were no cases of diabetes in those aged 15-24yrs. Interactions between significant variables were tested for significance. Two-tailed tests with \(\alpha = 0.05\) were performed using Stata 7.0 (College Station, TX).

A qualitative content analysis\(^2\) \(^4\) \(^2\) was applied to the responses to the open-ended question on constraints to consuming more fruit and vegetables. Responses were firstly entered into a Microsoft Access database and then imported into Stata 7.0 (College Station, TX). Responses were firstly coded and common themes determined and summed.
4.4. Results

Anthropometric measurements and a fasting blood sample were collected from 332 of the 706 residents aged 15 years or older identified in the house-to-house census. The study population was representative of the census population in terms of gender distribution. However, proportionately more older women (≥35yrs) participated than any other age group (p=0.01, Table 4.1). Information on diet and physical activity related behaviour was collected from 500 of the 706 community residents. Open-ended responses on constraints to fruit and vegetable consumption were collected from the eighty-five people who participated in the August to September screening round. This question was removed after the first screening round.

Table 4.1 Comparison of demographics of study population and the house to house census 2002

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study Population $^1$ n=148 (44.6%)</td>
<td>House to house census n=315 (44.6%)</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>35.8</td>
<td>33.3</td>
</tr>
<tr>
<td>25-34</td>
<td>23.7</td>
<td>28.6</td>
</tr>
<tr>
<td>35-44</td>
<td>21.0</td>
<td>17.1</td>
</tr>
<tr>
<td>45-54</td>
<td>12.2</td>
<td>13.3</td>
</tr>
<tr>
<td>55+</td>
<td>7.4</td>
<td>7.6</td>
</tr>
</tbody>
</table>

$^1$ fasting blood sample and anthropometry measurements collected

Almost half of the study population (47.3%) was lean (BMI<22 kg/m²), 30.4% were overweight (BMI≥25-<30 kg/m²) and 7.5% obese (BMI≥30 kg/m²). Leanness was particularly pronounced in the youngest age group (15-24yr), of whom 67.0% had a BMI below 22 (Table 4.2). BMI rose steadily with age up to 55-64 years and then declined. The mean BMI of the population was 22.6 kg/m². This average masks a 38% prevalence of overweight/obesity in those aged 35-64 years. There was no significant sex difference in prevalence of overweight (p=0.2) or obesity (p=0.08), although more women tended to be obese than men.
Table 4.2 Prevalence (%) of diabetes and leanness (BMI<22kg/m², by age group (years) and insulin resistance (geometric mean, 95% confidence interval)

<table>
<thead>
<tr>
<th>Age Group (yrs)</th>
<th>N</th>
<th>Diabetes % (CI 95%)</th>
<th>BMI &lt;22kg/m² % (CI 95%)</th>
<th>Insulin resistance N (geometric mean) (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>91</td>
<td>0 (0.0,4.0)</td>
<td>67.0 (56.4,76.5)</td>
<td>85 1.9 (1.6,2.2)</td>
</tr>
<tr>
<td>25-34</td>
<td>85</td>
<td>3.5 (1.0,10.0)</td>
<td>52.9 (41.8,63.9)</td>
<td>81 1.8 (1.5,2.2)</td>
</tr>
<tr>
<td>35-44</td>
<td>88</td>
<td>12.5 (6.4,21.3)</td>
<td>36.4 (26.4,47.3)</td>
<td>75 2.4 (2.0,2.9)</td>
</tr>
<tr>
<td>45-54</td>
<td>36</td>
<td>47.2 (30.4,64.5)</td>
<td>36.1 (20.8,53.8)</td>
<td>21 2.4 (1.7,3.5)</td>
</tr>
<tr>
<td>55+</td>
<td>32</td>
<td>28.1 (13.7,46.7)</td>
<td>18.8 (7.2,36.4)</td>
<td>23 2.5 (1.9,3.2)</td>
</tr>
<tr>
<td>Total</td>
<td>332</td>
<td>12.0 (8.7,16.0)</td>
<td>47.3 (41.8,52.8)</td>
<td>285 2.1 (1.9,2.3)</td>
</tr>
</tbody>
</table>

There was no sex difference in the prevalence of diabetes, (p=0.3). In addition to 34 people with diabetes, 6 participants were newly diagnosed. Among non-diabetics, 17 (5.1%) had an impaired fasting glucose level. Diabetes prevalence was highest in those aged 45-54 yrs (Table 4.2), but there were no cases in those <30 years of age. The prevalence of diabetes increased from 4.8% among those not overweight to 32% among the obese. Three of the 40 people with diabetes were classed as lean. Both BMI and age were significant predictors of diabetes (p<0.001) with no interaction between them (p=0.6). Relative to a BMI<22kg/m², there was a trend (not quite significant) to increased risk of diabetes among those with a BMI 22<25kg/m² (age-adjusted odds ratio=4.1, 95% CI 0.9-17.7, p=0.06). As expected, relative to being lean, being overweight or obese conferred a large excess odds (age-adjusted OR=24.1, 95% CI 6.0-96.5, p<0.001). Increasing age was also a strong risk factor, and Figure 4.1 illustrates the sharp increase in odds of diabetes as both age and BMI increased. In contrast, insulin resistance was related to BMI (p<0.001) but not age (p=0.4) (Table 4.2).
Figure 4.1 Diabetes prevalence by age and BMI category with n for each age-group by BMI category

As illustrated in Figure 4.2, approximately half of the study population reported consuming fruit 0-1 times/week (52.4%), and vegetables 0-1 times/week (53%). There were no significant sex differences although there was a trend towards significance for vegetable consumption (p=0.2 and p=0.8 respectively). People over 35 years reported eating fruit more frequently than young people (p<0.05).

Almost one-quarter of the study population reported consuming take-away food 4-6 times/week. Young people less than 35 years of age reported eating take-away food more often than older people (p=0.04) (Figure 4.3). Almost one third (30%) of young people, (15-24 years), reported eating take-away food 4-6 times/week. More women than men reported less frequent consumption of take-away food, although the difference did not reach significance (p=0.08) (Figure 4.2).

Traditional foods were consumed more than once a week by 71.4% of the study population with no significant sex or age differences. Almost one third (29.7%) of people reported eating Yolngu foods most days and nearly three-quarters (74.2%) of both young and older people reported hunting at least once a week.
One-third of participants reported hunting more than twice a week. A higher proportion of people aged ≥55yrs reported hunting >2 times/wk compared to the younger age-groups (Figure 4.4). This contrasted with sport, where mostly young people reported participating in sporting activities (Figure 4.4).

Figure 4.2 Prevalence of consumption of food categories 0-1 times/week, by sex

Figure 4.3 Prevalence of consumption of food categories >1 times/week, by age-group
Figure 4.4 Prevalence of participating in physical activities >2 times/week, by age-group

Among the population asked about eating more fruit and vegetables, almost all (96%) responded positively to needing to eat more fruit and vegetables. Sixty-eight percent of the reasons given for not eating more fruit and vegetables related to financial constraints. Other reasons related to living on the homelands, or were indirectly related to finances, such as smoking, availability of take-away food, money spent on kava, not satiating, rapid consumption by children after purchasing, and poor availability. Examples of these responses are displayed in Table 4.3.

Table 4.3 Responses to perceived constraints on fruit and vegetable constraints

<table>
<thead>
<tr>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>I don’t have enough money, so I hunt for bush food</td>
</tr>
<tr>
<td>I got no money to buy fruit</td>
</tr>
<tr>
<td>Only when stomach is full</td>
</tr>
<tr>
<td>Smoking and take-away food</td>
</tr>
<tr>
<td>Because we’ve got no money to buy fruit</td>
</tr>
<tr>
<td>Never go to the shop, no fridge, can’t afford them</td>
</tr>
<tr>
<td>Sometimes no money, price going up at the store</td>
</tr>
<tr>
<td>When I got no money, I don’t buy anything</td>
</tr>
<tr>
<td>Buy fruit and veg, but goes quickly because of children wanting it</td>
</tr>
<tr>
<td>There is no money to buy more fruit and vegetables</td>
</tr>
<tr>
<td>Because I’m always in the homeland centre</td>
</tr>
<tr>
<td>Kava – not much money</td>
</tr>
<tr>
<td>Only when there is fruits in the store</td>
</tr>
<tr>
<td>When I got no money I don’t buy anything</td>
</tr>
</tbody>
</table>
4.5. Discussion

The three most striking observations in relation to this study were the relative leanness of the population, particularly among young people, the low frequency consumption of fruit and vegetables reported, and the importance of financial constraints hindering consumption of fruit and vegetables.

While the mean BMI on the population as a whole was low, this did not reflect the variation by age, in particular the relatively high level of overweight and obesity among the middle-aged. There was no case of diabetes among people <30 years but the prevalence of diabetes rose sharply thereafter, as did overweight and obesity, and peaked in the age group 45-54yrs. The lower prevalence of diabetes reported in the older age-group is consistent with the lower mean BMI reported for older people. Although it would have been preferable to base diabetes diagnosis on a 2 hour oral glucose tolerance test (OGTT), previous experience indicated that this would have reduced participation.

Despite using a different classification and the over-representation of older women in the study population, the age-related patterns reported here are consistent with previous studies in Indigenous communities that did use an OGTT: high diabetes prevalence in middle aged groups in relatively lean populations75;77;80, no diabetes in those <30 years of age80;85, and lower prevalence in the elderly72;77. However, more recent studies from Central Australia, North-Western Australia and Northern Queensland report much higher rates of overweight and obesity3;54;92 and relatively high rates of diabetes among those aged <35 years90. This indicates that the epidemiological transition in Australian Indigenous populations is occurring at different rates and suggests that, in addition to broad policy reform, community level interventions should be tailored to the local situation.

This study allowed us to explore further the relationship between diabetes, age and BMI. Those with the lowest diabetes risk profile were lean and/or young. Two well conducted randomised controlled trials achieved important reductions in the progression of IGT to diabetes when overweight and obese people lost a mean of only 3.5kg243 and 5.6kg31 respectively through diet and increased physical activity. Given the increasing prevalence of obesity reported among Australian Aboriginal
populations, and the continuous nature of the relationship between BMI and both diabetes incidence and insulin resistance, our results and the results of other studies indicate that it is important to implement strategies now that will prevent further weight gain or lead to small weight loss.

O’Dea demonstrated that metabolic characteristics associated with diabetes and impaired glucose tolerance could be reversed by reverting to a traditional hunter-gatherer lifestyle. The few studies that aimed to reproduce this result using community-based initiatives have had mixed results. Despite improvements in food supply and/or consumption (assessed using store turnover, participant observation and/or measurement of dietary bio-markers), there were improvements in markers of cardiovascular disease risk but no reduction in overweight/obesity or diabetes prevalence. This suggests that type 2 diabetes and overweight and obesity present a more challenging public health problem and involve broader social determinants.

Until relatively recently type 2 diabetes was regarded as a disease of the middle aged and elderly. Unlike the general Australian population in which the prevalence rises steadily with age, our findings and those of other studies found that the oldest age-group had a lower prevalence of type 2 diabetes than the middle-aged. This is likely to be a combination of a cohort effect and a ‘healthy survivor’ effect. Older people also reported more positive dietary behaviours than younger people, such as eating fruit more frequently and less frequent consumption of take-away food. Furthermore, the high percentage of people aged 55 and over who reported hunting more than twice a week, suggests that people of this age-group may participate in traditional activities more than their younger counterparts. Studies in Northern Canada among Indigenous peoples of the Northern Arctic have similarly reported lower consumption of high fat foods and sugar and greater consumption of traditional foods among older people compared to younger aged people.

That more than half of the population consume both fruit and vegetables once a week or less is of concern. Infrequent consumption of fruit and vegetables was also reported in the 2004-05 National Aboriginal and Torres Strait Islander Health Survey.
where in remote areas, 20% and 15% of Indigenous Australians reported no usual daily fruit and vegetable intake respectively\textsuperscript{101}. There is strong evidence associating low intakes of fruit and vegetable consumption with increased risk of some cancers\textsuperscript{22,23,25} and CVD\textsuperscript{26,28}. In addition, fruit and vegetables as part of the total diet to aid weight loss among those with impaired glucose tolerance has been shown to prevent the onset of type 2 diabetes\textsuperscript{30-33}.

Food prepared outside the home is considered to contribute a large proportion to people’s diet in the NT\textsuperscript{245}. A higher frequency of consumption of take-away food among young people in this study compared to older people, is supported by Rowse et al\textsuperscript{145} who reported a lower proportion of food money expended at the take-away among older aged people compared to younger people less than 15 years of age.

This study suggests that people recognise the importance of consuming more fruit and vegetables but that financial constraints clearly influence their capacity to do so. There are limitations with the data indicating financial constraints as a key factor as only the first 85 people who participated in the first screening round were asked to respond to this question. Despite this limitation, the high prices of food reported in general for remote Aboriginal communities\textsuperscript{138} supports the preliminary finding of this study based on people’s perspectives, that financial constraint is a key driver of fruit and vegetable consumption. This finding is further supported by Smith who indicated that low income was an important determinant of people’s expenditure patterns\textsuperscript{149}.

\textbf{4.5.1. Conclusion}

The relatively high prevalence of diabetes in middle-age highlights the need for early intervention to prevent or delay the onset of excessive weight gain among young people. Financial constraints and age appear to be key factors influencing nutrition. Both diet and physical activity are two important proximal determinants of BMI. As discussed in Chapter 2, these two behaviours are influenced by the individual’s social and physical environment. An environment conducive for young people to attain and maintain an ideal weight is needed. The challenge is to understand the multi-levels of influence on behaviour to inform the development of strategies to support an enabling environment. The subsequent phases of this research will contribute to this understanding. This study component has identified key issues and areas of concern for the development of subsequent phases of this research.
Phase 2: A behavioural and environmental assessment of nutrition
Chapter 5. Dietary quality and the economics of food choice.

In this chapter as part of the epidemiological, behavioural and environmental assessment of nutrition, the community level dietary quality is described based on the collection and analysis of store point-of-sale data, and take-away and school canteen, food invoice data. Adequacies and deficiencies in the available food supply are considered in relation to recommended intakes and dietary data pertaining to wider Australia. The cost of dietary improvement is considered and implications highlighted. The contemporary application of the method of store-turnover is considered and approaches to address limitations are outlined.

5.1. Introduction

Poor diet has been identified as a major contributor to high levels of morbidity and mortality experienced by Aboriginal Australians\textsuperscript{16}. Lee et al\textsuperscript{8}, in 1994 developed the method of store-turnover to assess the dietary quality of food intake in remote Aboriginal communities. In the situation where the store is the single provider of purchased food in a community and where traditional food sources contribute minimally to dietary intake, store-turnover approximates the dietary intake of the community population\textsuperscript{8}. Using the method of store-turnover, Lee et al\textsuperscript{8} established dietary intake of the Aboriginal population residing in remote communities as generally high in energy, fat and refined sugars and low in fibre and some essential vitamins (vitamin A equivalents, riboflavin, vitamin E, vitamin B6 and folic acid) and minerals (calcium and zinc). There are no published data available that quantitatively assesses the contemporary dietary intake of remote community populations, nor has contemporary application of the method of store-turnover as a tool to determine community level dietary intake been reviewed.
5.2. **Aim**

The broad aim of this component of the research was to assess the nutritional quality of the community level non-traditional food supply and examine availability and cost of food as determinants of food choice and nutrition.

**Specific aims were to:**

a) Determine the nutritional quality of the community food supply in relation to recommended nutrient intakes and the dietary intake of wider Australia

b) Compare and contrast present dietary intake of the study community to previously reported dietary intakes of Aboriginal people in northern coastal communities of the NT

c) Examine food cost as a determinant of nutrition

d) Consider the advantages and limitations of contemporary application of the store turnover method

5.3. **Study design**

The principles of the store-turnover method were applied to assess the nutritional quality of the food supply. Characteristics of the current food supply were determined by comparison with dietary recommendations for all Australians\(^{152}\) and compared with dietary intakes reported for the wider Australian population using apparent consumption data\(^{246,247}\) and data from the 1995 National Nutrition Survey\(^{248,249}\) and available dietary intake data reported by Lee et al\(^{8}\) in 1986 and 1987 for three Northern Coastal communities.

The application of the method of store-turnover was appraised by comparing the turnover of store foods alone to that of the total turnover of foods available through all community food outlets. The expenditure required to improve community level intake was determined by calculating the cost differential between an estimated current cost of the available food supply and the cost of an improved food supply modelled on dietary recommendations for all Australians\(^{152}\).
5.4. Methods

5.4.1. Mapping the food supply

In the study community, food is available through multiple outlets and service providers\textsuperscript{250}. Important community level food sources were determined by firstly establishing for each food provider if food was primarily sourced through the community store, or externally, and secondly, by quantifying the contribution of each of the outlets to total fresh fruit and vegetable availability\textsuperscript{250}. Traditional food usage was not quantified in this study, although its contribution to the diet appeared to be significant.

5.4.2. Food data collection

The Store

Point-of-sale food data were provided from the community store for the months - May, June and July, 2005. A three month data period was selected in line with the store-turnover method developed by Lee et al\textsuperscript{8}. All food items with accompanying unique identifier, unit weight, quantity sold, and dollar value, were extracted from store data and compiled as an electronic product sales report. These data were generated by Worldsmart Retech Grocery Manager software which was installed in the store in late 2001. Sales data was only available for the store. The reliability of point-of-sale data to assess the nutritional composition of foods sold through the store depends on the proportion of foods scanned and accuracy of scanning. On average the Galiwin’ku store consistently achieves a scanning accuracy of over 95% (Personal communication ALPA Nutritionist, 2006). Electronic store data were directly imported into Microsoft Access.
Other food outlets

Weekly invoices of food orders were collected for the same three month period (May, June and July) in 2005 for the school canteen, Aged-Care Program and privately owned take-away outlets. Invoice data was entered into Microsoft Excel in the field and later imported to a Microsoft Office Access relational database. Copies of all invoices were made for the purpose of data checks and secured at Menzies School of Health Research.

5.4.3. Food Coding

Food items were matched with corresponding Composition of Food Australia (COFA) codes from the Australian Food and Nutrition database (AUSNUT 1999)\(^\text{251}\). The AUSNUT sodium data file was downloaded from the Food Standards Australia New Zealand (FSANZ) website\(^\text{251}\) and used with AUSNUT 1999. Edible portion percentages were derived from The Composition of Foods, (McCance and Widdowson)\(^\text{252}\).

Each COFA code covers a range of food products that are similar in nutritional composition. The COFA codes did not account for all foods available through the community food outlets, particularly newly marketed foods. For the food items that could not be matched directly with a COFA code, a description of the food was sought on the internet or through product catalogues and a best match of the food with a corresponding COFA code was then made. The nutritional composition for six different foods was sought from the internet and included in the database as no best match could be made with an existing COFA code for these foods.

5.4.4. Food and beverage classification

Food items were categorised into main food groups, sub groups and further categorised into a “specific group”. Main- and sub-groups were defined according to the AUSNUT Food Grouping System.
5.4.5. Food weights

For some food products it was possible to convert the information on the number of units sold into a mass or volume as this information was included with the food description. Using the specific gravity factor provided in the AUSNUT database\textsuperscript{251}, volumes were converted to mass. For the food categories where pack size information was not included as part of the item description, this information was obtained by either contacting the store manager and requesting the information, visiting the community store and sighting the product, searching the internet for product information, or visiting a supermarket and sighting the product. Weights for fresh fruit and vegetable produce were obtained from the supplier. These weights were checked against weights of the same product in a Darwin supermarket.

5.4.6. Major and moderate food sources

Major food sources contributing to nutrient availability were defined as: foods contributing 10\% or more of a specific nutrient\textsuperscript{249}. Moderate food sources were defined as: food items contributing 4-<10\% of a specific nutrient.

5.4.7. Data quality

Data were scrutinised during data entry, coding, and output processing, for accuracy and quality. Store data for 2005 were checked against data collected for 2001 and 2004 and monthly fresh fruit and vegetable data collected over a 12 month period including the 3 month collection period for 2005, to identify discrepancies.

Data entry and nutrition code assignment were performed by myself and a nutritionist, Pennie Clifford. Data quality checks were made at a number of stages including the stage of data import, coding and output processing. Output data were checked with ALPA representatives to identify anomalies.
5.4.8. Estimation of population

Population demographics as provided by the 2001 Australian Bureau of Statistics census data\textsuperscript{228}, were used to determine community level recommended nutrient intakes and recommended nutrient densities (Appendix 1, p.418-419). The number of pregnant and lactating women was determined from community health centre records where sixty-five pregnancies were recorded for 2001. Assuming a nine month gestation period, it was estimated that at the time of the 2001 census there were 49 pregnancies and 65 women breastfeeding. Breastfeeding is near universal in the study community and commonly occurs for at least 12 months, as reported among other Aboriginal populations\textsuperscript{10,253}. According to health centre records, ten percent of pregnancies were estimated to occur in the $<19$ yrs age group.

The community population size for 2005 was determined using the 2001 ABS census data as the base and adjusted for projected population growth\textsuperscript{228}. The reliability of the ABS census data was checked against a household census of adults 15 years of age and over, conducted in the study community in April 2002 as part of the community-wide diabetes screening described in Chapter 4. The household census accounted for 89\% of the adult population 15 years and over counted in the ABS census. No significant sex or age difference was observed between the ABS census and the household census (Table 5.1). While the population distribution of both the ABS census and the community household census were similar, both determined the population to be considerably less than the population determined by the 2001 Australian Electoral Commission, Northern Territory and the Ngalkanbuy Health Patient Database. Many of the people named on the electoral roll did not reside in the community at the time that the household census was conducted in 2002. This similarly applied to the Health Centre Patient Database.
Table 5.1 Age distribution of the Australian Bureau of Statistics Census 2001 and the house to house census 2002, for men and women

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>37.5 (153)</td>
<td>33.3 (105)</td>
<td>34.3 (151)</td>
<td>33.3 (130)</td>
</tr>
<tr>
<td>25-34</td>
<td>26.7 (109)</td>
<td>28.6 (90)</td>
<td>29.3 (129)</td>
<td>27.1 (106)</td>
</tr>
<tr>
<td>35-44</td>
<td>19.1 (78)</td>
<td>17.1 (54)</td>
<td>20.5 (90)</td>
<td>21.0 (82)</td>
</tr>
<tr>
<td>45-54</td>
<td>11.8 (48)</td>
<td>13.3 (42)</td>
<td>9.3 (41)</td>
<td>9.2 (36)</td>
</tr>
<tr>
<td>55-64</td>
<td>2.7 (11)</td>
<td>5.4 (17)</td>
<td>5.0 (22)</td>
<td>5.4 (21)</td>
</tr>
<tr>
<td>65+</td>
<td>2.2 (9)</td>
<td>2.2 (7)</td>
<td>1.6 (7)</td>
<td>4.1 (16)</td>
</tr>
<tr>
<td>Total</td>
<td>408</td>
<td>315</td>
<td>440</td>
<td>391</td>
</tr>
</tbody>
</table>

5.4.9. Nutrient analysis

Community level turnover, which comprised purchase data from the store and supply data for the take-away outlets, school canteen and Aged-Care program, was used to estimate the mean daily dietary intake of the community. Data for all food outlets was combined and total quantities for each food item tabulated. From this the average daily supply was calculated. Mean daily supply was assumed to approximate mean daily turnover for the data period. The pattern of ordering for stores and weekly orders for both the canteen and take-away, were consistent with observations by Lee et al.8

Apparent per capita daily consumption of food and nutrients was determined by dividing the mean daily community-turnover by the estimated population. Apparent consumption data was used to compare dietary intake of the study community with that of previously reported dietary intake data for remote coastal Aboriginal communities8 and wider Australia246,247.

5.4.10. Estimation of nutritional adequacy

Nutrient intakes were derived for 21 nutrients, including energy, carbohydrate, total sugars, protein, total fats, saturated fat, carbohydrates, fibre, vitamins and minerals.
The Acceptable Macronutrient Distribution Ranges (AMDR)\textsuperscript{254} were used to assess macronutrient distribution of the community food supply.

**Recommended Nutrient Intake**

Nutrient reference values for the community were determined by applying the recently published Estimated Average Requirements for the Australian population displayed in Tables 4-9 of the Nutrient References Values for Australia and New Zealand Executive Summary\textsuperscript{255} for each age and sex category, and adjusting values according to the population distribution of Galiwin’ku community (Appendix 1 p 418).

**Recommended Nutrient Density**

Dietary data was also expressed as nutrient density. The amount of each specific nutrient provided per MJ through the community food supply was calculated and presented as a percentage of the recommended nutrient density. The recommended nutrient density was derived from the Estimated Average Requirements and Estimated Energy Requirements calculated for each age and sex group of the Galiwin’ku community (including pregnant and lactating women) (Appendix 1, p 418-419).

Estimated energy requirements for the different age-groups (<2yrs; >2-18yrs; and 19->70yrs) and sex groups in the study community were calculated based on the Estimated Energy Requirement Tables 1-3 displayed in the Nutrient Reference Values for Australia and New Zealand\textsuperscript{255}. In calculating the estimated energy requirements for adults aged 19->70 yrs, the mean height and weight of each adult age-group was determined from anthropometric data collected through the community-wide health screening\textsuperscript{78}. For those <18 yrs, the mid-point of the estimated energy requirement range across each of the ages and sex category as displayed in Tables 1-2 of the Nutrient Reference Values for Australia and New Zealand\textsuperscript{255} was used to determine an estimated energy requirement for each age-group. The level of energy expenditure was estimated to be 1.4-1.6 basal metabolic rate (BMR) for both sexes and age-groups\textsuperscript{256}.
5.4.11. Comparison with dietary data for remote Aboriginal Australia and wider Australia

Dietary data from three Northern coastal communities collected by Lee in 1986 and 1987\textsuperscript{8} were used for comparison with the study community, in addition to data derived from the 1995 National Nutrition Survey\textsuperscript{248,249} and apparent consumption data for Australia\textsuperscript{246,247}. The 1995 NNS\textsuperscript{248} collected detailed self-reported information for people aged two years and over on food and beverage intake and based dietary analyses on an earlier version of the AUSNUT 1999 nutrient composition database developed by the Australia New Zealand Food Authority (ANZFA).

Nutrient density – wider Australia

For comparison purposes, nutrient densities were calculated for wider Australia based on dietary intake data and population demographics extracted from Table 5. Mean Daily Vitamin and Mineral Intake and Appendix 1: Population estimates and sample counts of the 1995 NNS report\textsuperscript{249} (Appendix 1, p 418).

Food serves – Actual and Recommended

The Dietary Guidelines for Australian Adults\textsuperscript{257} and Adolescents and Children\textsuperscript{258} provide suggested number of serves of core food groups\textsuperscript{259} for different age and sex groups over the age of 4 years.

The recommended number of serves of each of the core food groups for the study population was determined by applying the mid-point of the suggested serve range for each age and sex category, including pregnant and breastfeeding women, and adjusting in accordance with Galiwin’ku demographic data. The number of serves available through the community food supply was determined for each core food group and compared to the recommended number of serves calculated for the community population.
For comparison with the study community, the total number of fruit and vegetables serves consumed by wider Australia was determined from the 1995 NNS\textsuperscript{248}.

**5.4.12. Food cost and affordability**

Available store data on the dollar value of food purchased was used to estimate total community food expenditure. As sales data was only available for the community store, a gross estimate of total community food expenditure was made by extrapolating the energy cost (cost per kj) of foods sold through the store to the total energy (kj) available through the store, two take-away outlets, school canteen and Aged-Care program combined.

To demonstrate the price differential between foods available through the community store and a Darwin supermarket, a comparison of the purchase cost of a variety of 56 food items available through the community store in March 2005 to the cost of identical products available in a Darwin supermarket was made. These foods comprised my shopping over a two week period of residing in the community and included foods of low nutritional value in addition to core foods.

Energy dense, low cost foods were determined by calculating the energy cost (cost per MJ) and energy density (MJ/kg) for each food.

Modelling of the food supply was performed to increase the serves of core foods to meet the recommended number of serves for the study community, while maintaining constant energy. The cost of the modified diet was compared to the cost of the actual diet, using the same approach as described in Section 5.4.12.

Nutritional adequacy of the modified diet was determined by comparing the nutrient densities of the modified diet to the recommended nutrient densities for the community.
5.4.13. Market Basket Survey

The Market Basket Survey (MBS) is a survey of the cost, availability and quality of a standard basket of foods conducted annually in remote and rural community stores in the Northern Territory. The basket of foods provides 95% of the energy requirements and technically 100% of the nutrient requirements for a hypothetical family of six. Foods included in the MBS were entered into the Microsoft Access database and assigned corresponding COFA codes. The cost of the Market Basket was calculated based on store cost data. The representativeness of foods in the Market Basket to foods available through the store and community food outlets was determined, by comparing the average fortnightly intake for a family of six based on food provided through the community food outlets, as a proportion of foods available in the Market Basket. The proportion of the family household income required to purchase the Market Basket was determined based on an estimated fortnightly household income of $1710.52 used in the 2005 Market Basket Survey.

5.5. Results

5.5.1. Store turnover compared to total community food supply

In addition to the store, two independently managed take-away outlets, the school canteen, school breakfast program and a community Aged-Care program were identified as important food sources in the study community. Over the data collection period 1185 different food items were purchased through the store and 407 food items through the school canteen and take-away outlets. Table 5.2 shows the relative contribution of each of the food outlets to the total community food supply. The take-away was a major source of confectionery, pies, pasties, deep fried chips, chicken, beef, fruit juice and water. In contrast the school canteen and Aged-Care

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§ The hypothetical family of six comprises a grandmother aged 60 years, a man aged 35 years, a woman aged 33 years, a male aged 14 years, a girl aged 8 years, and a boy aged 4 years. The NT Government Department of Health and Community Services determined a fortnightly household income of $1710.52 based on Centrelink and Family Assistance Figures.
programs provided proportionately more fresh fruit and vegetables and the school canteen proportionately more wholemeal bread.

Table 5.2 Contribution of different food outlets to total availability of selected food items

<table>
<thead>
<tr>
<th>Food</th>
<th>Store</th>
<th>Percent contribution to total macronutrient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Percent contribution of food outlet to total weight of food item (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Store</td>
</tr>
<tr>
<td>Energy</td>
<td>79.3</td>
<td>18.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food</th>
<th>Percent contribution of food outlet to total weight of food item (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh fruit</td>
<td>41.3 19.3 20.0 19.4</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>71.2 9.8 3.1 15.9</td>
</tr>
<tr>
<td>Table sugar</td>
<td>88.6 10.9 0.5 -</td>
</tr>
<tr>
<td>Confectionery</td>
<td>49.0 45.6 5.40 -</td>
</tr>
<tr>
<td>Flour</td>
<td>91.8 7.0 1.2 -</td>
</tr>
<tr>
<td>Bread</td>
<td>90.1 8.9 0.9 -</td>
</tr>
<tr>
<td>Wholegrain bread</td>
<td>77.7 - 22.3 -</td>
</tr>
<tr>
<td>Pies &amp; pasties</td>
<td>36.3 56.5 7.2 -</td>
</tr>
<tr>
<td>Grains &amp; starch</td>
<td>91.1 7.7 1.2 -</td>
</tr>
<tr>
<td>Biscuits</td>
<td>95.5 1.1 3.4 -</td>
</tr>
<tr>
<td>Deep fried chips</td>
<td>8.1 91.9 -</td>
</tr>
<tr>
<td>Chicken</td>
<td>45.1 51.9 3.0 -</td>
</tr>
<tr>
<td>Canned corned beef</td>
<td>80.4 19.6 -</td>
</tr>
<tr>
<td>Beef</td>
<td>46.7 49.6 1.4 2.3</td>
</tr>
<tr>
<td>Aerated drinks</td>
<td>75.2 20.6 4.20 -</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>33.2 51.3 15.5 -</td>
</tr>
<tr>
<td>Water</td>
<td>55.4 38.4 6.30 -</td>
</tr>
<tr>
<td>Margarine</td>
<td>82.1 17.0 0.9 -</td>
</tr>
<tr>
<td>Milk &amp; milk products</td>
<td>77.2 21.5 1.4 -</td>
</tr>
</tbody>
</table>

1The Aged Care program provides a weekly basket of fresh fruit, fresh vegetables and meat to community clients

Relative to the 80% of energy contributed from the store, the apparent consumption of fresh fruit, confectionery, hot take-away food, beef, fruit juice and water was under-represented by the store-turnover. For these foods, analysis of store-turnover from the main community store alone would not account for a large proportion of the apparent per capita intake. For example, a store-turnover alone would underestimate fresh fruit by 54.2%, confectionery by 50.8% and hot take-away food by 68.2%.
Table 5.3. Apparent consumption of selected food items, community turnover compared to store turnover (per capita per day).

<table>
<thead>
<tr>
<th>Food</th>
<th>Apparent intake per capita per day (g/ person/day)</th>
<th>Relative contribution of store to community per capita intake (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community</td>
<td>Store</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>(g)</td>
<td>37.1</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>(g)</td>
<td>56.2</td>
</tr>
<tr>
<td>Table sugar</td>
<td>(g)</td>
<td>96.3</td>
</tr>
<tr>
<td>Confectionery</td>
<td>(g)</td>
<td>12.4</td>
</tr>
<tr>
<td>Preserves</td>
<td>(g)</td>
<td>14.8</td>
</tr>
<tr>
<td>Flour</td>
<td>(g)</td>
<td>83.5</td>
</tr>
<tr>
<td>Bread</td>
<td>(g)</td>
<td>109.9</td>
</tr>
<tr>
<td>Grains &amp; starch</td>
<td>(g)</td>
<td>26.1</td>
</tr>
<tr>
<td>Sweet biscuits</td>
<td>(g)</td>
<td>9.8</td>
</tr>
<tr>
<td>Poultry</td>
<td>(g)</td>
<td>19.9</td>
</tr>
<tr>
<td>Hot take-away food$^1$</td>
<td>(g)</td>
<td>64.8</td>
</tr>
<tr>
<td>Canned corned beef</td>
<td>(g)</td>
<td>15.4</td>
</tr>
<tr>
<td>Beef</td>
<td>(g)</td>
<td>20.9</td>
</tr>
<tr>
<td>Aerated drinks</td>
<td>(g)</td>
<td>248.2</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>(g)</td>
<td>47.8</td>
</tr>
<tr>
<td>Water</td>
<td>(g)</td>
<td>12.8</td>
</tr>
<tr>
<td>Margarine</td>
<td>(g)</td>
<td>14.6</td>
</tr>
<tr>
<td>Milk powder</td>
<td>(g)</td>
<td>29.6</td>
</tr>
</tbody>
</table>

$^1$Hot take-away food includes burgers, chicken, hot chips, pies and pasties and battered fish

Table 5.3 shows marked differences between the store-turnover and community-turnover when comparing actual food data. However, Table 5.4 shows that on comparing the macronutrient profile of store food (store-turnover) to that of the other food outlets combined (community-turnover), little difference in the distribution of macronutrients is observed.

Table 5.4. Apparent energy and macronutrient profile of community-turnover compared to store-turnover$^1$

<table>
<thead>
<tr>
<th></th>
<th>Community</th>
<th>Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent Energy (kj/capita/day)</td>
<td>9450.2</td>
<td>7494.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Macronutrient distribution</th>
<th>(%)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>11.8</td>
<td>11.7</td>
</tr>
<tr>
<td>Total fat</td>
<td>24.4</td>
<td>22.3</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>9.2</td>
<td>8.2</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>63.2</td>
<td>65.4</td>
</tr>
<tr>
<td>Total Sugars</td>
<td>35.2</td>
<td>35.7</td>
</tr>
</tbody>
</table>

$^1$Traditional foods were not included in community food supply analysis
This same observation applies when comparing nutrient density of the store-turnover to the nutrient density of the community food supply (Table 5.5). The largest variation in nutrient densities between the community and store was for vitamin C and β-carotene, where the nutrient densities for the store were markedly lower than that for the community food supply (Table 5.5). This is in line with the store contributing disproportionately less to fresh fruit and fruit juice turnover compared to the other community food outlets.

Table 5.5. Micro-nutrient density of store turnover compared to community turnover

<table>
<thead>
<tr>
<th>Nutrient per MJ</th>
<th>Community</th>
<th>Store</th>
<th>Store nutrient density as a percentage of community nutrient density (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A retinol equivalent (µg/MJ)</td>
<td>65.24</td>
<td>60.44</td>
<td>92.6</td>
</tr>
<tr>
<td>B-Carotene (µg/MJ)</td>
<td>167.70</td>
<td>134.4</td>
<td>80.1</td>
</tr>
<tr>
<td>Thiamine (mg/MJ)</td>
<td>0.16</td>
<td>0.17</td>
<td>106.3</td>
</tr>
<tr>
<td>Riboflavin (mg/MJ)</td>
<td>0.15</td>
<td>0.16</td>
<td>106.7</td>
</tr>
<tr>
<td>Niacin Equivalent (mg/MJ)</td>
<td>2.83</td>
<td>2.70</td>
<td>95.4</td>
</tr>
<tr>
<td>Total Folate (µg/MJ)</td>
<td>23.57</td>
<td>24.23</td>
<td>102.8</td>
</tr>
<tr>
<td>Vitamin C (mg/MJ)</td>
<td>6.66</td>
<td>4.71</td>
<td>70.7</td>
</tr>
<tr>
<td>Calcium (mg/MJ)</td>
<td>68.69</td>
<td>71.38</td>
<td>103.9</td>
</tr>
<tr>
<td>Phosphate (mg/MJ)</td>
<td>121.21</td>
<td>121.63</td>
<td>100.3</td>
</tr>
<tr>
<td>Magnesium (mg/MJ)</td>
<td>23.39</td>
<td>23.50</td>
<td>100.5</td>
</tr>
<tr>
<td>Iron (mg/MJ)</td>
<td>1.12</td>
<td>1.13</td>
<td>100.9</td>
</tr>
<tr>
<td>Zinc (mg/MJ)</td>
<td>0.81</td>
<td>0.78</td>
<td>96.3</td>
</tr>
<tr>
<td>Potassium (mg/MJ)</td>
<td>207.81</td>
<td>187.43</td>
<td>90.2</td>
</tr>
<tr>
<td>Sodium (mg/MJ)</td>
<td>284.00</td>
<td>283.83</td>
<td>99.9</td>
</tr>
</tbody>
</table>

5.5.2. Macronutrient distribution of community food supply compared to northern coastal communities in the 1980s and wider Australia

The contribution of individual macronutrients to total energy intake for the community food supply compared to dietary data for wider Australia\(^{247,249}\) and dietary data collected in 1986/1987 for northern coastal communities\(^8\) is depicted in Figure 5.1. This Figure shows a high contribution of carbohydrate to total energy for the study community with sugars contributing disproportionately to total carbohydrate. The contribution of protein and total fat to total energy is relatively lower for the study community than that shown for the northern coastal communities and wider Australia and for protein, according to the Australian and New Zealand
Nutrient Reference Values\textsuperscript{255} is at the lower end of the recommended macronutrient distribution range to ensure adequate micronutrient status.

![Bar chart showing percentage contribution of macronutrients to total energy intake for the study community, northern coastal communities, and wider Australia.]

Figure 5.1. Percentage contribution of macronutrients to total energy intake for the study community, northern coastal communities, and wider Australia

Most of the energy available through the community food supply was derived from total carbohydrate (63%) with relatively lower proportions of protein and total fat. Sugars contributed more than one third (35%) to total energy. The proportion of energy contributed by carbohydrate was comparable to that previously reported for the northern coastal communities, but higher than that for wider Australia (47.2\% reported by the 1995 NNS & 51.5\% reported by ABS, 1997/1998). The ratio of sugars to starch for the study community was identical to the ratio previously reported by Lee et al\textsuperscript{8} for the northern coastal communities.

The proportion of energy derived from protein was comparable to that previously reported for the northern coastal communities, but less than the lower end of the recommended intake range of 14\% to 25\% of total energy\textsuperscript{255}. It must be noted however that when one macronutrient predominates as carbohydrate does in this study, the relative contribution of the other macronutrients, that is protein and fat, to total energy will be distorted and may not reflect a true deficiency or excess of the macronutrient concerned.
The contribution of total fat to total energy intake was less for the study community (24.2%) compared to that previously reported for the northern coastal communities in the 1980s (32.7%)\textsuperscript{8} and for wider Australia (33.6%)\textsuperscript{249}.

5.5.3. Adequacy of the Community Food Supply

On examining the community nutrient density against the minimum required, as shown in Figure 5.2, there were deficits in magnesium, calcium, folate, zinc and potassium and much higher levels of sodium.

![Figure 5.2. Nutrient density of community food supply as a percentage of the community minimum required nutrient density](image)

As shown in Table 5.6, almost all nutrient levels were lower than that of wider Australia\textsuperscript{249} with the exception of sodium that was extremely higher.
Table 5.6. Nutrient density of study community compared to wider Australia

<table>
<thead>
<tr>
<th>Nutrient per MJ</th>
<th>Study community 2005</th>
<th>NNS 1995&lt;sup&gt;249&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>7.2</td>
<td>9.6</td>
</tr>
<tr>
<td>Vitamin A retinol equivalent</td>
<td>65.2</td>
<td>124.3</td>
</tr>
<tr>
<td>Thiamine</td>
<td>0.16</td>
<td>0.18</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.15</td>
<td>0.23</td>
</tr>
<tr>
<td>Niacin Equivalent</td>
<td>2.8</td>
<td>4.4</td>
</tr>
<tr>
<td>Total Folate</td>
<td>23.6</td>
<td>28.2</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>6.7</td>
<td>13.4</td>
</tr>
<tr>
<td>Calcium</td>
<td>68.7</td>
<td>93.6</td>
</tr>
<tr>
<td>Phosphate</td>
<td>121.2</td>
<td>162.2</td>
</tr>
<tr>
<td>Magnesium</td>
<td>23.4</td>
<td>34.6</td>
</tr>
<tr>
<td>Iron</td>
<td>1.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Potassium</td>
<td>207.8</td>
<td>345.5</td>
</tr>
<tr>
<td>Sodium</td>
<td>284.0</td>
<td>89.2&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>1</sup>There is no sodium value available for the NNS. 89.2mg/MJ is the recommended for the study community

5.5.4. Food sources of nutrients

Information on the main food sources of each nutrient reflects both the amount of food consumed and the level of nutrient found in the food<sup>249</sup>. Evident from Table 5.7 and Table 5.8 is the limited number of food items that contributed significantly to nutrient availability in the study community.

Food sources of macro-nutrients

Table 5.7 Food items in order of importance, contributing ≥4% to the macronutrients for the community food supply, 2005

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>Moderate food sources (food items contributing ≥4% to macronutrients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Sugar, flour, bread, milk powder, margarine, hot take-away food&lt;sup&gt;1&lt;/sup&gt;, aerated added-sugar drinks.</td>
</tr>
<tr>
<td>Protein</td>
<td>Bread, milk powder, flour, chicken, steak, canned corned beef, pork</td>
</tr>
<tr>
<td>Total Fat</td>
<td>Margarine, hot take-away food, milk powder, processed meats, poultry, bread</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>Milk powder, hot take-away foods, margarine, processed meats, sweet biscuits</td>
</tr>
<tr>
<td>Monounsaturated fat</td>
<td>Margarine, chicken, milk powder</td>
</tr>
<tr>
<td>Polyunsaturated fat</td>
<td>Bread, margarine, flour, oil</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>Sugar, flour, bread, aerated added-sugar drinks</td>
</tr>
<tr>
<td>Refined sugar</td>
<td>Sugar, aerated added-sugar drinks, milk powder, cordial, preserves, confectionery</td>
</tr>
<tr>
<td>Fibre</td>
<td>Bread, flour, fresh vegetables, weetbix, hot chips, fresh fruit</td>
</tr>
</tbody>
</table>

<sup>1</sup>Hot take-away food comprises pies & pasties and deep fried chips
Energy

The high proportion of carbohydrate contributing to total energy as shown in Figure 5.1 was due to a high intake of mainly sugar, bread and flour. Two major food groups, cereals and cereal products together with sugar and confectionery contributed 56% of the total energy intake (Figure 5.3). Four single food items, table sugar (16.3%), flour (12.8%), bread (11.5%) and milk (7.6%) provided approximately 50% of the total energy. Moderate sources of energy intake were hot take-away foods (5.2%), margarine (4.6%) and aerated added sugar drinks (4.3%). Fruit contributed no more than 1% to total energy intake.

![Pie chart showing percentage of energy derived from each food group]

**Figure 5.3. Percentage of energy derived from each food group, total community turnover 2005**

Protein

Cereal and cereal products (40.9%) contributed most to protein intake. Approximately one-third (33.6%) of protein intake came from meat and meat products and 15.2% from milk and milk products. Major sources of protein intake were: bread (14.6%), flour (13.2%) and milk powder (11.8%). Of the meat and meat
product group, chicken (5.7%), steak (5.3%), canned corned beef (5.1%) and pork (4.2%) were important sources of protein.

**Total fat**

Margarine (19.1%) and milk (14.6%) were major sources of total fat, providing approximately one-third of total fat intake. Hot take-away foods, contributed 10.6% to total fat intake. Processed meats (6.4%) and poultry (5.1%) contributed more to total fat in the study community than fresh meat cuts (3.7%). Dairy products were an important contributor to total fat intake and contributed almost one third (30.3%) of the saturated fat intake. Other contributors to saturated fat were: milk powder (22.3%), hot take-away foods (13.2%), margarine (8.7%), and sweet biscuits (4.5%). Less than one-tenth (6.3%) of the total weight of milk was reduced fat milk.

**Sugars**

Eighty-three percent of total sugars was derived from table sugar alone and sweetened beverages. Table-sugar as a single food item provided 48% of the total sugar intake. Seventy-three percent (73.5%) of the table sugar available was raw sugar.

**Fibre**

Cereal and cereal products and vegetables were the major food groups contributing to dietary fibre. The major sources of dietary fibre were bread ((26.1% - (white hifibre** 12.5%)) and white flour (20.4%). Fresh vegetables (7.3%), weetbix (6.4%), deep fried potatoes (5.6%) and fresh fruit (4.7%) were moderate sources of dietary fibre.

**The store carries a product locally produced by a Darwin bakery that is a high fibre bread and is fortified with B vitamins and folate.**
Food sources of micro-nutrients

Table 5.8 Food items in order of important contributing ≥4% to selected micronutrients for the community food supply2005

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>Moderate food sources (food items contributing ≥4% to selected micronutrients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A equivalents</td>
<td>Fresh vegetables (sweet potato, carrots), margarine, milk powder, fresh eggs</td>
</tr>
<tr>
<td>Total folate</td>
<td>Bread, weetbix, tea, fresh vegetables, flour, milk powder</td>
</tr>
<tr>
<td>Calcium</td>
<td>Milk powder, bread,</td>
</tr>
<tr>
<td>Iron</td>
<td>Flour, bread, weetbix, vegetables, canned corned beef, beef</td>
</tr>
<tr>
<td>Zinc</td>
<td>Bread, milk powder, canned corned beef, steak, flour</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Fresh vegetables, fruit juice, fresh fruit, fruit drinks</td>
</tr>
<tr>
<td>Thiamine</td>
<td>Bread, flour, weetbix, rolled oats, pork</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>Milk powder, weetbix, rolled oats, tea</td>
</tr>
<tr>
<td>Niacin</td>
<td>Bread, flour, weetbix, rolled oats, pork</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Bread, flour, milk powder, weetbix, rolled oats, tea</td>
</tr>
<tr>
<td>Sodium</td>
<td>Bread, baking powder, salt, canned corned beef</td>
</tr>
<tr>
<td>B-carotene</td>
<td>Sweet potato, carrots, pumpkin, capsicum</td>
</tr>
<tr>
<td>Potassium</td>
<td>Milk powder, fresh fruit</td>
</tr>
</tbody>
</table>

Fruit and vegetables

Considering the minimal contribution of both fruit and vegetables to total energy availability (Figure 5.3), both vegetables and fruit, particularly fresh produce, contributed significantly to fibre and micronutrient availability (Table 5.7 and Table 5.8). Vegetables contributed nearly one third (31.3%) of available Vitamin A equivalents and were a moderate food source for total folate with around half of the folate from vegetables coming from fresh vegetables. Vegetables (37.2%) and fruit (13.7%) were the major food groups contributing to vitamin C. Of the fruit category contributing to vitamin C, 92% was fresh fruit, and of the vegetables, 88% of the vitamin C was from fresh vegetables. Fresh vegetables provided 67.8% of β-carotene. Fresh fruit was an important source of potassium, contributing 4.1%.

Cereal and cereal products

Cereal and cereal products contributed most to total folate (46.2%). This was mostly due to a high consumption of fortified products such as bread and breakfast cereal (mainly weetbix). As with folate availability, a large proportion of the iron available in the community diet was derived from fortified cereal products, mainly flour.
(16.4%), bread (16.2%) and weetbix (8.1%). Bread (17.6%) was also a major food source of calcium. Both bread and flour were major food sources of thiamine, niacin and magnesium. The most commonly consumed breakfast cereals, weetbix and rolled oats, were moderate sources of the B vitamins and magnesium. Cereal and cereal products (32.5%) contributed nearly one-third of zinc availability. This was largely contributed by bread (11.1%).

Tea

Tea, largely because of the volume consumed (an estimated 900 ml per capita per day) was a major contributor to total folate (12.2%) and a moderate source of riboflavin (6.4%) and magnesium (4.2%).

Milk and milk products

Milk and milk products, mainly as milk powder, was an important food source of calcium, magnesium, riboflavin, potassium and zinc. Over half (54.1%) of the calcium intake was provided by milk and milk products, with 42.6% derived from powdered milk. Milk powder contributed 10.8% of zinc availability.

Meat and meat products

Approximately one-quarter of the iron intake was derived from the meat and meat products food group, despite this category contributing only 10.7% to total energy. Canned corned beef (5.5%) and beef (4.1%) were important food sources of iron. Meat and meat products (40.1%) were a major source of zinc. This was largely contributed by canned corned beef (9.0%) and steak (8.5%).
5.5.5. Food Intake compared to northern coastal community and wider Australia

Apparent intake

The apparent per capita intake of foods for the community food supply is represented in Table 5.9 and compared to apparent consumption data of foods for which there was data available from the three northern Australian communities and wider Australia.

Table 5.9. Apparent intake of selected foods for the study community compared to northern coastal communities and wider Australia (g/capita/day)

<table>
<thead>
<tr>
<th>Food and/or food group</th>
<th>Galiwin’ku community, 2005¹</th>
<th>Northern Coastal communities, 1986/87²</th>
<th>1995 NNS³</th>
<th>ABS, 1998/1999⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kJ/capita/day)</td>
<td>9450.2</td>
<td>13 254 ±536</td>
<td>9067.5</td>
<td>12 100</td>
</tr>
<tr>
<td>Fruit</td>
<td>41.3</td>
<td>48.2</td>
<td>142.8</td>
<td>364.7⁵</td>
</tr>
<tr>
<td>Vegetables</td>
<td>75.8⁶</td>
<td>53.7</td>
<td>237.4</td>
<td>443.8⁷</td>
</tr>
<tr>
<td>Bread</td>
<td>109.9</td>
<td>83.6</td>
<td>89.6</td>
<td>146.3</td>
</tr>
<tr>
<td>Fruit juices</td>
<td>47.8</td>
<td>35.1</td>
<td>144.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Aerated drinks</td>
<td>248.2</td>
<td>615.3</td>
<td>129.2</td>
<td>309.6</td>
</tr>
<tr>
<td>Muscle meat</td>
<td>40.9</td>
<td>133.2⁸</td>
<td>42.6</td>
<td>220.0</td>
</tr>
<tr>
<td>Poultry</td>
<td>19.9</td>
<td>54.0</td>
<td>20.2</td>
<td>84.4</td>
</tr>
<tr>
<td>Processed meats</td>
<td>17.6</td>
<td>27.7⁹</td>
<td>5.2</td>
<td>n/a</td>
</tr>
<tr>
<td>Snack food</td>
<td>4.6</td>
<td>7.4</td>
<td>4.9</td>
<td>n/a</td>
</tr>
<tr>
<td>Sugar, honey &amp; syrups</td>
<td>105.4</td>
<td>137.8⁰</td>
<td>11.8</td>
<td>118.9¹¹</td>
</tr>
<tr>
<td>Flour</td>
<td>83.5</td>
<td>121.6</td>
<td>n/a</td>
<td>191.0</td>
</tr>
<tr>
<td>Pie/paste</td>
<td>17.9</td>
<td>41.4</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Notes: The food grouping system used for the 1995 NNS was applied to derive apparent intake values for the study community. Variations to this food grouping system for the Northern Coastal communities and the ABS apparent consumption data are marked below.

¹Values based on edible portions and population base of 1467
²Lee, 1994, data collected 1986/87, values converted from kg/capita/year to g/capita/day
³NNS Foods Eaten, Australia 1995, values from population data and mean daily intake data for age and sex groups used to derive a population mean intake
⁴ABS, catalogue no. 4306.0. Apparent consumption weights for 1998-1999 converted from kg/capita/year to g/capita/day
⁵Includes fruit for juice
⁶Excludes deep fried potatoes
⁷Includes potato
⁸Value for beef and lamb
⁹Value for tinned meat
¹⁰Value for Table sugar
¹¹Includes all sugars – cane sugar, honey, glucose and syrups, but excludes sugars in fruit and milk. Cane sugar comprises packed refined sugar and sugar used in manufactured foods.
Table 5.9 shows the energy intake for the study community to be more closely aligned with the 1995 NNS data and that for northern coastal communities to be closer to the wider Australia apparent consumption data.

The main difference observed between the study community and that of wider Australia as shown in Table 5.9, was a very low per capita consumption of fruit and vegetables and very high per capita sugar consumption. Similar to observations previously reported by Lee et al, the consumption of fruit and vegetables and fruit juice was markedly lower in the study community compared to that of wider Australia.

The per capita intake of fruit (excluding juice) for the study community was less than one third of that reported by wider Australia (1995 NNS). Similarly, the intake of vegetables (including potato) was less than one half of that reported for wider Australia (1995 NNS).

Compared to wider Australian data derived from the 1995 NNS, similar intakes of muscle meat, poultry, snack foods and bread were reported for the study community and a higher intake of processed meats, aerated added-sugar drinks and sugar and preserves.

The per capita intake for sugar was around 9 times that reported for the 1995 NNS and closer to apparent consumption data for wider Australia. Although the per capita intake of aerated added-sugar drinks for the study community was two times higher than that reported by the 1995 NNS, it was approximately half (47%) of that reported for the northern coastal communities in the 1980s. Worth noting is that the total quantity of fruit juice and aerated added sugar drinks for the study community was similar to that reported for wider Australia (1995 NNS).

5.5.6. Serves of core foods

The number of serves of the core food groups available for purchase in the community, are presented in Table 5.10 and compared with the recommended
number of serves for the community and the average number of serves consumed by wider Australia (1995 NNS)\textsuperscript{248}.

Table 5.10. Number of serves of core foods available in the community per capita compared to the recommended number of serves and that consumed by wider Australia

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Recommended number of serves per capita per day\textsuperscript{1}</th>
<th>Actual available servings per capita per day\textsuperscript{2}</th>
<th>1995 NNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals (including breads, breakfast cereals, rice, pasta and noodles)\textsuperscript{3}</td>
<td>7.2</td>
<td>5.6</td>
<td>-</td>
</tr>
<tr>
<td>Vegetables (including legumes\textsuperscript{4})</td>
<td>4.3</td>
<td>1.4\textsuperscript{5}</td>
<td>3.2\textsuperscript{6}</td>
</tr>
<tr>
<td>Fruit</td>
<td>2.2</td>
<td>0.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Milk, yoghurt, cheese and/or alternatives\textsuperscript{8}</td>
<td>2.1</td>
<td>1.4</td>
<td>-</td>
</tr>
<tr>
<td>Lean meat, fish, poultry, eggs, nuts &amp; legumes\textsuperscript{9}</td>
<td>1.0</td>
<td>1.0</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: The required sample serve was calculated based on the midpoint of the recommended number of serves for each age and sex group for the eating pattern that includes a relatively large amount of cereals. Serving numbers for extra non-core foods were not included.

\textsuperscript{1}Based on a population estimation of 1405 for residents aged 4 years and over including pregnant and lactating women.

\textsuperscript{2}Based on the community food supply that includes the store, school canteen, take-away and Aged Care program. Contribution of traditional foods is not included.

\textsuperscript{3}Excludes biscuits, cakes, pies & pastries and other cereal foods with added sugar and fat.

\textsuperscript{4}The legumes available in the food supply are mainly baked beans.

\textsuperscript{5}Includes vegetables juices (tomato and vegetable blend) which are negligible and potato

\textsuperscript{6}Not including legumes.

\textsuperscript{7}Includes juice (only 100% no added sugar fruit juice included).

\textsuperscript{8}Includes ice creams, custard & flavoured milk.

\textsuperscript{9}Canned meats & canned meals not included.

Table 5.10 shows that while the number of meat serves at the community level was adequate, the number of serves of cereals (excluding cereals with added sugar and fat), fruit, vegetables, and milk and milk products, were less than the average number of serves recommended per capita.

A comparison of the number of fruit and vegetable serves consumed per capita with that reported for wider Australia (1995 NNS)\textsuperscript{248}, reveals the per capita intake of fruit and vegetable serves to be less than one half (41\%) of the number of serves consumed by wider Australia (1995 NNS) and approximately one third (32\%) of the number of fruit and vegetable serves recommended per capita per day.
As in wider Australia\textsuperscript{249,257}, calcium was a limiting nutrient in the community food supply and less than the required number of serves of milk and milk products was shown to be available. Considering the importance of milk powder as a source of calcium in the community food supply, approximately 21 g of milk powder per capita per day would be required to increase milk serves to the required level.

Although the proportion of energy contributed by carbohydrate was high, the intake of cereals with no added sugar or fat was less than required. Bread (38\%) and white flour (28.9\%) comprised over 60\% of the total weight of cereals and cereal products available, and rice, noodles and rolled oats together contributed almost 20\% of the total weight of cereals. Wholegrain bread comprised 4.0\% of total bread weight.

**Fruit and vegetable serves**

**Vegetables**

In the study community, potato (including deep fried potato) provided half a vegetable serve per capita per day and contributed more than one third (35.7\%) of the vegetable serves consumed. In 2005, fresh vegetables contributed 59\% to the total weight of vegetables through the community food supply. Twenty-nine varieties of fresh vegetables were available over a three month period. The ten vegetables that contributed most to total vegetable weight in order were potato, sweet potato, onion, cabbage, capsicum, lettuce, carrot, broccoli, pumpkin, and celery. Baked beans contributed 7.4\% to the total weight of the vegetable category. The contribution of both canned and frozen vegetables (excluding frozen potato) was minimal.

**Fruit**

More than half of the 0.9 fruit serves available in the study community were provided by fruit juice (0.4 serves). This was the same for wider Australia where fruit juice provided approximately one half (52.6\%) of the 1.9 fruit serves. In 2005, fresh fruits contributed 91.6\% to the total weight of fruit available in the community food supply and 18 varieties of fresh fruit were available over a three month period. The five fruits contributing most to total fruit weight in order were apples, oranges,
bananas, grapes and rockmelons. The contribution of canned and dried fruit to total fruit availability was minimal.

5.5.7. The Market Basket Survey

Figure 5.4 shows the availability of community foods as a proportion of Market Basket foods. More eggs, fresh meat, sugar and cereal products (rolled oats, weetbix, rice, bread and flour) and less canned products, dairy foods, fresh fruit and vegetables, were consumed by the community, than what is represented in the Market Basket.

Figure 5.4 Proportion of Market Basket foods consumed per household per fortnight
Based on 2005 store cost data, the cost of the Market Basket was 29% more in the study community than in a Darwin supermarket\(^{138}\). The average energy cost of the market basket at $0.83/MJ, was higher than that of the store food supply at $0.82/MJ.

The proportion of the fortnightly hypothetical household income required to purchase the Market Basket, after adjusting the Market Basket to provide an equivalent energy intake to the community food supply, was 38.1%.

### 5.5.8. Cost of community food supply

The largest food expenditure category for the study community based on store expenditure data was cereal and cereal products (27.2%), followed by non-alcoholic beverages (20.3%), meat and meat products (19.2%) and milk and milk products (8.7%). Expenditure on fats and oils (1.6%), fruits (2.4%) and vegetables (5.3%) were low in comparison. Compared to household food expenditure data for non-remote NT\(^{260}\), total expenditure on food and non-alcoholic beverages for the study community, was higher for flour, bread, meat and meat products, sugar and aerated added sugar drinks, and lower for fresh fruit and vegetables, confectionery, and fruit juice (Table 5.11).

### Table 5.11 Percent contribution of food item to total food and non-alcoholic expenditure, total community store expenditure vs. non-remote NT household expenditure\(^{172}\)

<table>
<thead>
<tr>
<th>Food item</th>
<th>Proportion of food item contributing to total food and non-alcoholic expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community store (%)</td>
</tr>
<tr>
<td>Flour</td>
<td>3.4</td>
</tr>
<tr>
<td>Bread</td>
<td>8.5</td>
</tr>
<tr>
<td>Meat and meat products(^{1})</td>
<td>19.2</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>1.9</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>2.7</td>
</tr>
<tr>
<td>Sugar</td>
<td>3.7</td>
</tr>
<tr>
<td>Confectionery</td>
<td>3.8</td>
</tr>
<tr>
<td>Aerated added sugar beverages</td>
<td>11.8</td>
</tr>
<tr>
<td>Juice</td>
<td>1.0</td>
</tr>
</tbody>
</table>

\(^{1}\)Excludes fish and seafood and meat products sold through store take-away
In terms of dollar value for energy availability (in ascending order of cost/MJ), sugar, cooking oil, rice, margarine, and white flour were the cheapest food items purchased through the community store, each costing 20 cents or less per MJ. The five food items on which most money was expended through the community store were bread, aerated added sugar drinks (mainly coca-cola drink), powdered milk, sugar (white & raw sugar combined) and flour.

Figure 5.5 shows that the energy-dense, nutrient-low foods such as sugar, flour, fats and oils cost the least, while the energy-low, nutrient-dense foods, such as fruit and vegetables and meat cost the most.

![Figure 5.5 Relation between the energy density of selected foods and log of the energy cost ($/MJ). Figure adapted from Drewnowski and Specter²⁶¹](image)

A comparison of the cost of 56 food items purchased in March 2005 over a two week period in the community store compared to the cost of identical items purchased in a Darwin supermarket within an adjacent two week period showed that, in total, store items cost 50% more than the total cost of the same items purchased in the Darwin supermarket (Appendix 2, p 420-421). This mark up in cost was consistent across all
store food items included in the shopping basket except fresh fruit and vegetables which attract a freight subsidy.

In line with the ALPA nutrition policy (1990)\textsuperscript{129}, fresh fruit and vegetables were marked up the least. The limited number of fresh fruit and vegetables included in this comparison cost 10\% more than the same fruit and vegetables purchased in a Darwin supermarket. Appendix 2 (p 420-421), details the food items and corresponding purchase cost for the community store and Darwin supermarket. The cost differential between regular foods purchased in the community and the Darwin supermarket was much higher than the cost differential of 29\% reported by the Market Basket.

5.5.9. Cost of dietary improvement

To determine the cost and feasibility of improving the nutritional quality of the diet, we modelled the current diet to reduce the availability of refined carbohydrate and saturated fat and to increase the availability of fruit and vegetables. Table 5.12 shows the current and modified turnovers of specific food items available through the community food supply. Modified turnover was modelled on current turnover and modified to meet recommended number of serves of core foods while maintaining constant energy availability. Improvements in the community food supply required: increasing fruit 5.9 fold and vegetables 3.8 fold; increasing the turnover of milk powder 1.7 times, and more than doubling (2.4 times) the turnover of wholegrain bread.

To maintain energy balance and reduce availability of refined sugar and saturated fat as recommended by the Australian Guidelines for Healthy Eating\textsuperscript{152}, we halved the turnover of aerated added sugar drinks, canned corned beef, pies, and hot chips. In addition, a ten-fold increase in bottled cold water was required to replace the aerated added sugar drinks. We also halved the availability of table salt to assist in reducing sodium intake.
Table 5.12 Current turnover (g/capita/day) and modelled turnover (g/capita/day) of specific food items

<table>
<thead>
<tr>
<th>Food item</th>
<th>Actual quantity (g) per capita per day&lt;sup&gt;1,2&lt;/sup&gt;</th>
<th>Modelled quantity (g) per capita per day&lt;sup&gt;1,2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit</td>
<td>41</td>
<td>245</td>
</tr>
<tr>
<td>Vegetables</td>
<td>76</td>
<td>285</td>
</tr>
<tr>
<td>Milk powder</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Wholegrain bread</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Table sugar</td>
<td>96</td>
<td>48</td>
</tr>
<tr>
<td>Aerated added sugar drinks</td>
<td>248</td>
<td>132</td>
</tr>
<tr>
<td>Water</td>
<td>13</td>
<td>130</td>
</tr>
<tr>
<td>Canned corned beef</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Hot chips</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>Pies</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Salt</td>
<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<sup>1</sup> Derived from total weight, not edible portion  
<sup>2</sup> Quantity based on population of 1467

In contrast to the deficiencies observed in the community food supply (Figure 5.2, p 118), Figure 5.6 shows that the modeled diet except for potassium meets or exceeds the minimum required nutrient density for all nutrients. As table salt provides only 20% of sodium availability in the community food supply, without modifying turnover of bread and other food products contributing to sodium intake, sodium remains very high in the modeled diet.
Improving the nutritional quality of the community food supply in line with dietary recommendations for all Australians, would cost a further 20% to the estimated current food expenditure. This estimation however is derived from store food costs as food costs from other community food outlets were not available. The pricing structure of the private take-away is comparable to a convenience store rather than a supermarket, and is relatively more expensive than the community store.

5.6. Discussion

5.6.1. Dietary quality of the community food supply

One of the most striking findings is the broad similarity between the results of this study and that reported for the northern coastal Aboriginal communities\(^8\) conducted twenty years previously; the major problems of very high sucrose intakes and very low fruit and vegetable intakes remain despite efforts to improve dietary quality of...
remote community food supplies\textsuperscript{4,5,12,18,19}. There has however been a major change where canola derived fats have replaced fatty meats as an important fat source. High levels of table sugar per se remain an important energy source as opposed to fruit and vegetables.

In general, the reported dietary profile has been associated with a higher risk for CVD\textsuperscript{26,28,62-67}, some cancers\textsuperscript{22-24,68} and dental caries\textsuperscript{69,70}. The challenge is to understand the reasons for the persistence of a dietary pattern that is characteristically high in sucrose and low in fruit and vegetables.

\textbf{5.6.2. Similarities of dietary pattern to low income populations}

The dietary pattern reported here and previously by Lee et al\textsuperscript{8} has largely been attributed to conservative food preferences developed through rationing and reinforced by a limited availability of healthy food choices, high food costs, limited household storage capacity and inadequate nutrition and budgeting literacy\textsuperscript{8}. Whilst ethnographic studies have suggested a link between dietary patterns and poverty, a theme that has received little attention is the similarity of the distinctive dietary pattern observed among some Aboriginal populations to the dietary pattern characteristic of people of lower socio-economic position (SEP). Relative to their more affluent counterparts, people of lower SEP have been shown to broadly consume a diet of lower nutritional quality; to be more likely to eat less fruit and vegetables\textsuperscript{271-273}; to consume a higher proportion of dietary energy as refined sugar; to have a lower intake of fibre; and to have a lower intake of a range of micronutrients, notably calcium, folate, magnesium, vitamin C, vitamin A and carotenoids\textsuperscript{274-276}.

The association between fat intake and SEP has not been as consistent as other nutrients\textsuperscript{27,28}. This resonates with the similarities and differences observed between the dietary intake of the study community and that previously reported by Lee et al\textsuperscript{8} where there were large differences in the contribution of fat to total energy intake, but similar nutrient profiles to that described above.
Darmon et al\textsuperscript{278} demonstrated through diet modelling that decreasing the cost of a typical French diet while maintaining a constant energy level and retaining a diet as close as possible to the average population diet, resulted in a progressive increase in the proportion of energy from fats and carbohydrates, including sugar. This was compensated for by a decrease in the protein content of the diet. With each incremental cost constraint, nutrient densities decreased progressively to levels lower than the population reference intakes\textsuperscript{278}. The contribution of meat, fish, cheese, and fruit and vegetables to dietary intake decreased, and cereals, processed meat, milk, sweets and added fats increased. The increase in added fats however was not paralleled with an increase in total fat, as fat associated protein sources also decreased\textsuperscript{278}. The resulting food pattern was similar to dietary patterns observed among other groups of low socio-economic position\textsuperscript{278} and strikingly similar to that reported for the study community as detailed in Section 5.5.

\textbf{5.6.3. Economic constraints determining food expenditure}

There is no comprehensive available household expenditure data for Aboriginal Australians, nor has the level of poverty among Aboriginal Australians been quantified. Using data from the 1986 ABS housing census, and population and income distribution surveys, Ross and Whiteford\textsuperscript{279} estimated that nearly twice (48.7\%) the proportion of Aboriginal income units with 4 or more children had an income below 100\% of the poverty line than non-Aboriginal income units, and 30.8\% were in the severe poverty category (below 80\% of the poverty line) compared to 16.7\% of non-Aboriginal income units.

In remote areas of the Northern Territory, around half (52.7\%) of Aboriginal and Torres Strait Islander people are in the lowest income quintile\textsuperscript{41}. Considering that 83\% of the study community 15 years of age and over are not in the formal labour force\textsuperscript{228} compared to 34.3\% of Indigenous people in non-remote NT, it is likely that the level of poverty for the study community is higher than that of the national estimate for Indigenous Australians.
Amplifying this disadvantage disproportionately is the high cost of food in remote communities as documented previously\textsuperscript{133,138} and supported by this study. The similarity of the dietary pattern of the study community to that of other low income populations and the likelihood of a large proportion of households falling within the severe poverty category, strongly suggests that economic constraints undermine the dietary choices of Aboriginal people in the study community.

The proportion of household income expended on food has been suggested as a proxy indicator of poverty\textsuperscript{148}. The proportion of household income expended on food and beverages for the study community could not be ascertained from available data. However households in the lowest income quintile in non-remote NT, expend almost one half (49.4\%) of mean gross weekly household income on food and non-alcoholic beverages, compared to 12.1\% for all households in non-remote NT\textsuperscript{280}. Urban Indigenous communities are not included in the household expenditure data for non-remote NT\textsuperscript{280}. As the cost of food has been shown to be disproportionately higher in remote areas and that most people are on welfare, it is likely that households in the lowest income quintile in remote NT expend more than half of their mean gross weekly household income on food and non-alcoholic beverages.

The NT Market Basket Surveys\textsuperscript{138,281} have consistently shown higher food costs in remote Aboriginal communities compared to urban centres. It is commonly contested however that better food choices as those recommended by the MBS are within people’s financial means. As shown in Section 5.5.7, the Market Basket does not reflect actual purchasing patterns and in fact assumes conservative food preferences, limited availability of fresh produce in community stores, and the resources and desire to prepare all meals in the home. Lastly, judgements regarding the affordability of the MBS assume that all entitled family members receive a government benefit and that family incomes in all Aboriginal communities in the NT are the same. The MBS does not indicate food affordability.

There is the perception at a high government level in Australia that better food choices by Aboriginal people are within their current means. Results from the annual NT MBS perpetuate this view. As shown in Section 5.5.7, the MBS, which provides a higher quality diet in terms of nutritional value than the current
community level diet, can be purchased at the same cost as the current diet. This implies that with education and dietary behaviour change, an improved diet is achievable within people's current means. However, through this study we have provided evidence to refute the perception that a healthy diet is not an affordable option for most Indigenous people living in remote communities.

Firstly, the estimated community level expenditure on food and non-alcoholic beverages presented in section 5.5.9 (p 131), is likely to be an under-estimate for two reasons: 1) total food expenditure was derived from store food costs which in general are less expensive than the take-away outlets whose prices reflect that of a convenience store, rather than a supermarket; and 2) the cost of procuring traditional foods, such as fuel costs, vehicle maintenance and gun licenses is not included.

Secondly, using the current diet to model the cost of dietary improvement (as detailed in Section 5.5.9), a modified diet derived from the actual diet would require an additional 20% on top of current food expenditure. As already noted, this is likely to be an underestimate of the true cost as it was derived from store cost data where fruit and vegetables are subsidised and store prices are generally less than the take-away outlets. In addition to individual level cost, the cost of dietary improvement needs to be considered in relation to community level costs, such as improved store infrastructure and carrying capacity, and the cost of modifying social norms to change community level eating behaviour from lower cost high energy foods to nutrient-dense foods.

As detailed in Section 5.5.8, margarine, oil, sugar, flour and rice were shown to provide dietary energy at the lowest cost and provided over one third of the energy content of the diet. Sugar, as table-sugar, accounted for approximately one fifth of the energy content of the diet and was the cheapest energy source. In contrast, low energy foods such as vegetables (excluding potato chips) provided dietary energy at maximum cost. Other foods commonly recommended such as reduced fat milk products or healthier take-away alternatives were also relatively costly in terms of energy value. Given the differential in energy costs between energy dense and low energy foods, dietary recommendations such as reducing sugar and sugar products and increasing fruit and vegetable consumption, or choosing low fat products, may
have adverse economic consequences for the majority of people in the community who are low income consumers.

The ‘economics of choice’ argument developed by Drewnowski and Specter\textsuperscript{261} may not always seem rational considering the popularity of take-away foods, particularly among young people, and their relatively associated high cost in the study community. However the cost, taste and convenience of buying a pie at $1.67/MJ ready to eat, or a hamburger at $2.84/MJ, may far outweigh the cost of buying uncooked mince meat at $2.57/MJ, a beef steak at $3.77/MJ or a prepared cold meat and salad pack at $7.30/MJ.

Studies have suggested that food insecure people employ a number of strategies to maintain energy intakes that ironically may increase their risk of overweight and obesity. These are summarised by the Center on Hunger and Poverty and the Food research and action center\textsuperscript{282} as:

- maximising energy through purchasing lower cost foods with relatively higher energy levels per dollar\textsuperscript{261;283;284}
- reducing food spending by changing the quality or variety of food consumed before reducing the quantity of food eaten\textsuperscript{285}
- over eating when food is available\textsuperscript{286;287 288}
- women restricting their own intake to protect their children from hunger and then overeating when food is available\textsuperscript{285}.

While it is beyond the scope of this thesis to explore the relevance of these behaviours to the present study context, the high prevalence of overweight and obesity among middle-aged adults shown in Chapter 4 Section 4.4, coupled with the high cost of food and a dietary pattern shown to be similar to other low income populations, suggests that these behaviours may be relevant to the study population.

The findings presented in this chapter indicate significant cost implications in achieving a healthy diet for Aboriginal Australians in line with that recommended for all Australians. The perception of the Australian Minister for Health and Ageing,
The Honourable Mr Tony Abbott that “Indigenous people should just eat better” is not an affordable option for people in the study community. In view of the economics of food choice theory, the suggestion of “labelling foods with calorie content” proposed by the Honourable Tony Abbott at the recent obesity summit, would only further exclude Aboriginal Australians and indeed other low income groups, from the opportunity for improved health. As Drewnowski and Specter conclude, the obesity epidemic may be an economic problem not a medical problem. Indeed, without these economic considerations, well intentioned nutrition education and health promotion may only be serving to increase the health inequality between Aboriginal people and wider non-Aboriginal Australia.

5.6.4. Comparison with data for Northern coastal communities from the 1980s

The similarities between results reported here and those reported by Lee et al two decades earlier are as important as the differences. Comparisons however must be interpreted with caution as results reported here are limited to one community (albeit a large community) and are based on largely point-of-sale data rather than invoice data. The method of store-turnover which tabulates food-turnover based on food orders is analogous to apparent consumption data produced at the national level. It does not account for wastage or slow stock turnover.

This study shows the community-turnover which is largely derived from point-of-sale data to be closer to the consumption data reported by the 1995 NNS, than apparent consumption data at the national level. This was particularly so for energy intake and hence may explain the reported difference in per capita energy intake between this study and that of Lee et al. There may also be discrepancies when comparing data based on food groups between studies. Effort has been made where relevant in the results section to indicate where there was likely to be a discrepancy in the food grouping. Apparent consumption data also assumes an accurate population base.

A major strength of the store-turnover method is that it can measure nutrient density, and macronutrient profiles as a percentage of total energy intake, thereby alleviating
the need to determine population size\textsuperscript{8,53}. Apparent consumption data, whilst potentially unreliable as it is dependent on population size, is useful in making comparisons of per capita consumption of specific foods over time. Lee et al\textsuperscript{8} proposed that multiple and regular household census be conducted over the period of store-turnover to determine population size. For the present study, this proposed method was considered impractical due to the size of the study community. Instead we used ABS census data\textsuperscript{228} as an estimate of population size and found this data to be a more accurate indicator of the community population than the electoral roll 2001, when compared with a one-off population census we conducted early in the study period.

It is more likely that the estimated population is an underestimation rather than an overestimation. Inaccuracies in population size would therefore be more likely to result in an over-estimation of apparent per capita nutrient and food intake rather than an under-estimation. A further problem in estimating population size is determining the number of people residing in neighbouring homelands who obtain produce through the store.

Despite these limitations, the dietary inadequacies documented by Lee et al in the 1980s\textsuperscript{8} remain and are consistently shown in the analyses presented in this chapter. A striking contrast however between the study community and the northern coastal communities in the 1980s relates to fat consumption. Not only was the relative contribution of fat to total energy intake in the current community markedly less than that reported previously, but the foods contributing to fat intake in the two studies differed markedly. Where fresh fatty meat cuts were previously reported by Lee et al\textsuperscript{8} to contribute more than 20% to total fat intake in the northern coastal communities, meat sales were relatively low in the study community. Instead, milk powder and margarine contributed most to fat intake.

Lee et al\textsuperscript{8} documented a much lower meat consumption among the northern coastal communities in the 1980s compared to the central Australian communities and ascribed this difference to a potentially greater accessibility of traditional animal foods in the northern coastal communities\textsuperscript{8}. The current study was not able to measure traditional food usage due to the difficulties in reliable quantification\textsuperscript{8}. The
apparently low intake of meat consumption may be due to both people accessing meat through traditional foods, and to economic constraints limiting food expenditure as described previously and shown to occur among other low income populations.

5.6.5. Contemporary application of store turnover method

This analysis has shown that since the store-turnover method was developed in 1986, the number of players in the food supply system has increased, although the store remains the single largest food supplier overall. These results suggest that analysis of food turnover from the major food outlet is a reasonable approximation of the macronutrient and micronutrient profiles of the community food supply as it provides approximately 80% of energy. However a store-turnover alone may under- or over-estimate particular categories of food. For example, in the current study, the school made a disproportionate contribution to total fruit intake which would be missed in a dietary assessment if only the major food outlet was assessed.

The implications of this are particularly relevant when considering evaluation of nutrition interventions as the apparent effect could be dependent on whether other settings are included in the evaluation. Store-turnover as a method however, can be extended to include other food sources, thereby becoming a “community food turnover”. Thus the method of store-turnover when extended to be a community-turnover retains its usefulness in estimating dietary intake at the community level.

However a number of issues need to be addressed before the store-turnover method can be widely applied. These have been identified and described in a publication to determine the usefulness of the store-turnover method to assess community level dietary intake250. In brief, the store-turnover method has been rarely, if ever, used outside of a research setting, due to its complexity and the time and skill level required for analysis. The contemporary application of the store-turnover method is even more complex than when originally developed as the number of food lines available through remote community stores have increased as have the number of food outlets in communities. In addition, the various food sources are rarely all
owned by the community council, so a multiplicity of relationships must be formed before information can be accessed to do a community-food-turnover. For these reasons, nutritionists in remote Australia have not used the store-turnover as a method of dietary assessment or as a monitoring tool. The absence of a practical monitoring tool has resulted in inadequate evaluation of nutrition interventions and a dearth of current and relevant dietary information on remote community food supplies.

The electronic availability of data with computerisation of stores and food outlets could expedite the store-turnover method, through eliminating manual entry of data from store invoices and creating the facility through a relational database to automatically relate coded food items to nutrition composition tables and automatically generate reports. However the complexity of analysis and interpretation of the data remains. Also whilst it is likely that larger remote stores will computerise in the near future, smaller stores, take-away outlets and school canteens are unlikely to, thereby requiring manual entry of food invoice data.

A simplified version of the store-turnover technique is needed to assess, monitor and improve dietary quality. The National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan\textsuperscript{37}, has prioritised the development of effective indicators, evaluation criteria and feedback mechanisms for nutrition related initiatives.

This study has identified key indicator foods and food groups that need to be modified in order to improve dietary quality of community residents; fruit and vegetables, sucrose, high sugar beverages, wholegrain cereals, and dairy or calcium-containing foods. Investing resources in developing, trialing, implementing and maintaining a monitoring system based on these indicator foods is needed and would serve to direct the focus and limited resources on the key dietary problem areas.

Chapter 10 outlines such a tool to assist in improving the nutritional quality of the food supply in remote Aboriginal communities. However, it would seem from the findings presented in this chapter that unacceptable poverty remains a major driver of poor quality diet. This is explored further in the following chapters.
Phase 3: An educational and ecological assessment of nutrition
Chapter 6. The influence of historical factors on nutrition: Losing control, whose responsibility?

This chapter is the first of the three chapters that report on the ecological assessment of factors influencing nutrition and nutrition improvement. In this chapter, the influence of Australian government policy on the food supply, and the diet of Aboriginal people of the Northern Territory in general, is examined over the period of 1870 (the first year of NT government administration) to 1972 (when assimilation policy was succeeded by a policy of self determination). Focusing on Elcho Island mission (In 1969 Elcho Island mission was renamed Galiwin’ku township), I describe developments in the food supply and examine these in relation to diet.

““If you are my friend, it is your privilege to give me gifts and my privilege to accept them”” (Burramurra, Elcho Island Mission, 1950s)

6.1. Introduction

“The future is in our history”291. Yolngu often refer to the past informing the present and future (Personal communication, Yalu'Marnggithinyaraw 2003). This is also expressed in the Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research65. The ramification of the history that unfolded following European settlement of the Northern Territory is palpable today in the everyday lives of people. The contradictions of excessive control and government indifference since European settlement have underpinned policy directives that firstly aimed to “protect”, and then later to assimilate Aboriginal people to “white” society (of Anglo Celtic origin). It is against this background of control and undermining of Aboriginal agency that contemporary programs to improve diet must be considered292.

A contemporary analysis of influences on nutrition and nutrition improvement cannot ignore the institution of rationing. This applied very widely to food, clothing and other goods, such as blankets and tobacco, and spanned nearly a century of
colonial government in the Northern Territory from the 1870s to the late 1960s. An in-depth examination of the institution of rationing in Central Australia by Rowse provides a critique from which to examine changes in the food supply in relation to Elcho Island mission.

Rowse describes three phases of Central Australian colonial government that assist in understanding the shifts in practice relating to the provisioning of food for Aboriginal people. The first is the early phase of colonisation, from the 1870s to the late 1920s, where power over life and death was transparent. This period was characterised by Aboriginal land being usurped by Europeans with both police and citizens involved in murderous campaigns. There were few welfare interventions to enhance Indigenous life. The second phase was characterised by rationing beginning to replace violence as a mode of government. Rowse indicated that both “pastoralists and missionaries were learning the value of rationing as a way of rendering cross-cultural relationships peaceful and predictable” (p 6). While rationing was considered a necessity by the donors, the concern that it pauperised and demoralised Aboriginal people existed as an unsolvable dilemma.

Accepting the policy of protection, (provided for by the Aboriginal Ordinances 1910 and 1918), as largely passive and ineffectual, the third phase of government from the 1930s to 1950s as defined by Rowse, hoped to avert demoralisation through becoming actively interventionist, and subsidising missions and pastoralists to coordinate rationing with government’s rehabilitative programs of training for citizenship and subscribing to the norms of Australian life. The paradox was that rationing, which was viewed as productive of dependency and demoralisation, became the basis of training for citizenship.

From 1960 to 1975, a transformation of the rationing system occurred with the substitution of cash for rations through the introduction of award wages and social security payments. As the quest for assimilation heightened, Rowse reasoned that rationing became the instrument of a number of competing objectives: to keep children attending the clinic and school, it was advisable to ration parents as well; but to teach adults, particularly men to work for a living, it was necessary to withhold rations from those who were able-bodied unless they worked. Furthermore, to
encourage the formation of the self-supporting household based on the typically Anglo Celtic nuclear family, earners were expected to redistribute their earnings to non-earners. However, cooking and eating together as a family was replaced by communal feeding regimes based on other considerations: child nutrition, lessons in table manners and the policing of sharing. As Rowse explained, assimilation and the associated institution of rationing, eventually collapsed under the weight of these contradictions, forcing the government to face up to promoting the strengths of Indigenous social forms and identity which had survived the rationing regime.

Rowse contended that rationing as a tool to “assimilate” was fundamentally a faulty tool, as it involved the issuing of goods for a more complex and ill-defined return. While it provided the means to bring the donor and recipient together in a relationship, it did not demand a congruent understanding of that relationship. Rowse demonstrated that it cannot be assumed that objects embedded in enduring relationships, in this case rationed items, are given the same significance by all who are party to those relationships. Indigenous people brought their own understandings to their rationing relationships with the colonists. According to Rowse, “when people accepted rations, they were not only simply accepting nourishment, they were behaving so as to set up and then continue a relationship” (p 207).

On reviewing the work of other anthropologists, Rowse distinguished two models of rationing: the ‘trade’ and ‘nurturance’ models based on the Indigenous notion of reciprocity. The ‘trade’ model, where labour or sexual services in some instances was ‘purchased’ by the issue of rations and a position of equality expected with the transactor, and the ‘nurturance’ model, where there was the expectation of being looked after by others who assumed authority, and obedience reciprocated. “Acculturation” or assimilation required control by the government over the meaning of the rationing transaction. Rowse demonstrated that the meanings conjectured by the donors however, were never consistent. Indeed, Rowse argued that rationing helped to preserve cultural difference rather than guarantee the recipients acculturation. Rationing therefore, Rowse contended, contrary to the government motive of rationing to instil the principle of individual effort and reward, preserved a capacity for self-determination.
This chapter, through examining changes in the food supply in association with mission and government policy, seeks to examine the capacity for self-determination in the Elcho Island context of rationing.

6.2. Aim

The broad aim of this component of the study was to examine changes in the food supply in association with mission and government policy and to examine the influence of these changes on past and present nutrition behaviour of Aboriginal people of Elcho Island mission.

6.3. Data sources

Archival data was collected from the Northern Territory Government Archives Service, the Darwin Branch of National Archives, and the Mitchell Library in Sydney. Interviews were conducted with six older Aboriginal residents of Galiwin’ku community and with four non-Aboriginal people who had been directly associated with the Methodist Overseas Mission. Significant developments in the food supply pertaining to the Elcho Island mission from pre-European settlement to 1972, concerning the store, garden, rations and hunting, are summarised in Appendix 4 (p 424-431).

6.4. Ethics

Archived material

Written approval was granted by the Uniting Church of Australia Northern Synod, the Church Missionary Society and by Mrs Nancy Giese (next of kin for Mr Harold Giese) to access archived documents requiring permission to access.
Interviews

Written consent was gained from each of the interviewees. A copy of the transcript was returned to each of the interviewees. Community-based interviewees were returned an audio copy of the interview and a printed copy of the interview transcript.

6.5. Findings

6.5.1. To civilize and Christianise

...bell rings, service and then the issuing of rations to the Aboriginals in employment, after which all return to their camps for breakfast. 7.30am bell sounds for work assembly...10am work halts and receive billy of tea...work inspection and the work continues through to 11.30am, the bell then rings to announce that the mornings work is over. 2.30pm general assembly. If work complete have the rest of the day off. 5.30pm days work officially ends...missionary inspects that tools returned, goats yarded, young kids [goats] fed, then issuing of the evening rations

The Methodist Overseas Mission (MOM) established its first mission in northern Australia in 1916, and later in 1922, obtained a lease for Elcho Island from the government, exempt from compulsory stocking clauses and rent free. A house was constructed on Elcho Island, but in 1923 moved 40 km west to Milingimbi, an area that was considered unsuitable for settlement but considered in need of missionary intervention. According to missionary and government documents, the people of Arnhemland were dreaded and renowned for their so called treachery and savagery, believed to have resulted from centuries of contact with Malay trepang fishermen. The Elcho Island mission was not re-established until 1942 when the Rev Harold Shepherdson, who had been with the Milingimbi mission since 1927 and subsequently lived at Elcho Island until 1977, moved the sawmill equipment from Milingimbi mission to Elcho Island as a temporary war measure. The MOM approved Elcho Island as a “full station” in 1944. Shepherdson remained as the mission Superintendent to 1969.
Missions were encouraged by the government to establish in government-demarcated reserves to assist in controlling the movement of Aboriginal people, and to regulate relationships between Aboriginal and non-Aboriginal people. An area of Arnhemland was proclaimed a reserve in 1931. Measures to civilise and Christianise went hand in hand and the government viewed the mission as an agent to instil in Aboriginal people the moral value of “work and reward”. By the time the MOM entered the northern frontier, rationing had been accepted across the NT as a means of controlling and remunerating Aboriginal labour and reconciling peaceable relations. The 1918 Aboriginal Ordinance which gave the legal power for a Chief Protector to contain Aboriginal people on reserves or compounds, also required that employers hold a licence for employment of Aboriginal people and that conditions be set out by agreement between the employer and Chief Protector. This generally required that rations, accommodation and clothing be provided for the employees and dependents, usually at the discretion of the employer.

There was no mission or government policy on rationing. The government position on rationing, supported by the mission, was “aborigines should be taught that if they would eat they must work”. Rations served a rudimentary social welfare role and missions were subsidised by the government to provide rations for the aged and infirm. Rations in the early mission days at Milingimbi consisted mainly of flour and tobacco. As there was no sufficient herd of beef cattle, meat was rarely provided in rations except on special occasions, such as on Christmas day, when goats were slaughtered and the meat distributed. The issuing of rations occurred alongside hunting and gathering. Foraged foods, marine and other animal products supplemented the largely flour-based diet provided by the mission. Men were expected to work for their ration, “to teach them the dignity of labour.”

The women carrying a rush mat that they swung in front as they came to the flour tub, which was out in the open by the store. The little tots also came up with old tins and bark to get their bit of flour.

The purpose of rations initially was to attract people to remain on the mission where they could be taught the dignity of labour and be Christianised. Rations were doled out after the morning church service. In 1927, with 400 people reported as staying
for longer periods at Milingimbi mission, the missionaries had difficulty finding work for all the men.

Rations had not previously featured as a mainstay of the work of the MOM. The long-term experience of the MOM was among agricultural-based populations in Asia and the South Pacific. Missions had been established among largely settled populations who gained their subsistence through gardens not unsimilar to a mode of agriculture familiar to Europeans. The missionaries were able to focus on their evangelical work, without needing to provide for the physical needs of their potential converts. Having no experience working among a hunting and gathering society, and no guiding policy, the mission did not perceive mission work possible unless people were centralised. This presented an unsolvable dilemma for the mission as the prospect of “doling” out rations to attract people to settle and form a mission, conflicted with the stout Christian philosophy of toil and reward. The mission accepted that “doling” out rations to settle people would be the initial state of affairs, and would later be rectified through the industry of the people themselves:

…it is impossible to think of a mission without there being people to whom that mission ministers. It is just as impossible to think of trying to do anything by running around the country after little nomadic groups of more than half a dozen to a couple of dozen people. Therefore, a certain number of them must be brought, or allowed to come, together; and to do that the natural resources of the country must be supplemented in some way by the mission. Ultimately, we hope it will be by the industry of the people themselves; but meanwhile someone else must, to a large measure, do it for them. We may apply to it the term spoon-feeding, or any other; but there the undeniable fact remains, and the necessity of some measure of support must be recognised while we move as wisely and as rapidly as is possible towards a more satisfactory state of affairs.\(^{302}\)

Gathering in one place where foreign goods were available, was not a new phenomena to Yolngu. For centuries people had gathered annually for prolonged periods with the arrival of the Macassan fishermen during the season for harvesting trepang. Various forms of trade were negotiated between the visitors and local people, including the trade of rice, tobacco and rice-based alcohol. This trade also occurred with Japanese pearlers.
Besides the attraction of rations, people with a strong cultural attachment to the land where the missionaries had settled, may have initially remained on or near the mission as obligatory care-takers of the land. It is likely that the mission also provided a secure abode, at the time when clashes with Europeans, or rumours of brutality prevailed, in addition to tribal conflict. There was also an element of curiosity that attracted people to the missions. People were initially cautious of the white-man’s food, but were curious to find out if it “suited them” (Interviewee 2004).

Whatever the reasons for settling on the missions, in June 1923, the Milingimbi mission was rationing a population of 275. At this time the mission received less than £1 per person per annum from the government, considerably less than the expenditure on rations. In 1926, the expenditure for flour was estimated at over £1,100 per annum\textsuperscript{303}. Increased acreages were considered essential to recuperate the “enormous expenditure” on flour and to grow better and more varieties of food such as rice and corn, than providing white flour alone\textsuperscript{303}.

6.5.2. Tilling the soil and disciplined toil

The incongruence between issuing food supplies and progressing with the churches evangelical program reached a crisis point in 1929, when the northern missions were advised by the MOM board to reduce expenditure on flour and tobacco. The incongruence between rationing and evangelism could however be justified, and in so doing, expenditure reduced. Tilling the soil and learning to be food producers, rather than food collectors, was considered a pre-requisite to being civilised. This had been part of the colonial psyche since days of first contact with Aboriginal Australians. In the mid 1800s Captain Philip was given command of “civilising” Aboriginal people in an area of South Australia, with the vision of people settling in an abode, farming the land, and the children being instructed in the Christian religion\textsuperscript{304}.

In the late 1800s two Catholic missions commenced in the NT with the plan “to settle the aboriginals on the ground and to turn them into a farming population” \textsuperscript{305}. The Catholic mission reported to the government in their annual report: “If we succeed in
this we are convinced to succeed in bestowing Christian civilisation upon them”\textsuperscript{305}. In subsequent years lack of funds was identified as hindering any real progress in the mission of “civilising and Christianising”\textsuperscript{306}. This was to become the ongoing cry of subsequent mission endeavours.

Rev Theodore Webb, chairman of the Northern Australian MOM District from 1928 to the late 1930s and superintendent of Milingimbi mission, with concern for the advancement of Aboriginal people, insisted that tilling the soil and learning to be agriculturalists was a necessary evolutionary step in the process of becoming civilised and therefore Christianised. Webb wrote in the Missionary Review:

\begin{quote}
The establishment of a mission means the congregating of a large number of primitive folk, for whom practically everything must be provided. It is however, clearly recognised, that to provide for them the necessities of life without requiring from them something in the way of individual effort, would be but to further degrade them; and so labour must be provided, and an endeavour to teach them something of the dignity and necessity of toil. So we start agriculture, hoping that they will ultimately adopt a more settled mode of life, and learn to produce foodstuffs for themselves. Labour, as we understand it, is entirely something foreign to them…\textsuperscript{307}.
\end{quote}

Evident in this passage are assumptions about the rationing relationship between the missionary and the ration recipients; that the missionary would take responsibility for the physical needs of the Aboriginal person and in return the singular person rather than the family group would produce food for themselves and subscribe to the Christian doctrine and way of life. Although at this stage, hunted and gathered foods very much sustained people, and the mission rations simply provided extra, the effort of Aboriginal people in providing for their nutritional needs through traditional means was dismissed and not considered honest labour as “they trusted to the bush and wild growth to give them food”\textsuperscript{308}.

The traditional lifestyle of Aboriginal people was considered “not a very comfortable sort of life”, and that “there is not much chance of progress in such conditions”\textsuperscript{309}. The viewpoint of the missionary in terms of Aboriginal people and ability to self-provision contains contradictions: Aboriginal people were self-sufficient and not
dependent on hand-outs while practicing their traditional way of life. The missionary however needed to centralise people and to do so needed to attract people through rationing. On centralising people however, the mission could not provide for their material needs. Participating in food production therefore, rather than being a critical evolutionary step in being civilised, was essential for the survival, of perhaps the missionary, more so than the Aboriginal.

A presumption of evolutionary inferiority of the Aboriginal way of life however underpinned missionary belief and practice. This inferiority was assumed to apply to character. Body cleanliness was considered an indicator of the Aboriginal person’s inner life and character. Rowse stated that “citizenship was not just a matter of entitlements, it also implied a certain model of independence, self-sufficiency and responsibility”293 (p 4). To achieve character and civilisation, Aboriginal people were expected to participate in labour that was disciplined and supervised:

By the discipline and hardship of honest toil, taught, provided and supervised by some authority, the aboriginal can achieve character and civilisation without dying as a race. Through the dust of a plough, the whirling chips of the sawmill, the salt spray of the fishing vessel, he shall at last see the Christ he has heard preached 310.

Underpinning the motive of the missionary was the prevailing belief on which the protection policy had been composed, that Aboriginal people were doomed to extinction on European contact. The mission strongly believed that through divine intervention, as the result of hard, disciplined toil, Aboriginal people could be saved. Without supervised instruction, Aboriginal people were considered to be vulnerable to pauperism. Rowse showed that ‘pauperism’ was a key construct in Central Australian colonialism and central to ‘expert advice’ on the Aboriginal. Judgements on people’s moral character were made, based on their behaviour as recipients of rations. “Pauper” as defined by Rowse in the Central Australian context, was a term of “moral and political disapproval used by would-be helpers to describe the lack of co-operation of the poor with philanthropy’s conditions”293 (p 40). This view of Aboriginal people assumed a fragile grounding in their own culture and inevitable demoralisation on contact with European goods293. Pauperism was a central construct of Territory colonialism.
Dr Donald Thomson, an anthropologist who lived among Aboriginal people on their native lands from 1935 to 1937 and who later commanded an Aboriginal reconnaissance unit in Arnhemland during World War 2, outlined four assumptions that he believed misguided and underpinned both government and MOM policies. These were that:

1. the Aboriginal culture was to be destroyed with “civilisation”
2. a necessary step in assimilation is to firstly master an agricultural lifestyle
3. their own food supplies were inadequate
4. the necessity of gathering their own food supply inflicted hardship\textsuperscript{311}.

Thomson was a proponent of establishing inviolable reserves for Aboriginal people where both the government and missions could provide support without centralising people. E.W.P Chinnery, appointed as the Director of the newly established Native Affairs Branch in 1940, sketched out a policy where inviolable reserves would each have a central station that would serve as a centre for training, education and welfare and for the cultivation of food. This scheme was never implemented.

### 6.5.3. Precarious supplies and food shortages

The provision of rations to Milingimbi mission depended precariously on supplies being delivered by the mission lugger where a round trip to Darwin took close to three weeks. This trip was undertaken every three months and less often during the monsoon season, depending on weather conditions. Supplies were not always available in Darwin, nor always fit for consumption\textsuperscript{312}. Indeed in 1927 a shortage of food, chiefly flour, butter and tinned milk, provoked a strike by non-Aboriginal government employees in the Darwin area\textsuperscript{313}. The inadequacy of flour rations was highlighted in 1929 where shortages of beef and game due to severe drought in Central Australia, resulted in 75 cases of scurvy and suspected beriberi, and 37 deaths\textsuperscript{297,314,315} among Aboriginal residents on a mission in Central Australia\textsuperscript{316}. Until the late 1920s, multiple cases of death from beriberi were reported among non-Aboriginal people, particularly among men who worked in the gold reefs\textsuperscript{317,318}, and incarcerated Aboriginal people in the Darwin prison and Aboriginal compound in
Darwin\textsuperscript{319-321}, from an inferior and monotonous diet of flour and rice with little or no fresh produce.

During times of food shortages on Milingimbi mission, the majority of residents would leave the mission temporarily and revert to their previous way of life\textsuperscript{322 323 324}. Gifts of food and tobacco were perceived as the most powerful factors in keeping Aboriginal people on the missions and it was assumed that people would not work “if tobacco or the means to it were not given to them, as well as essential foodstuffs”\textsuperscript{325}. The provision of rations and availability of other goods however did not always hold people at the mission stations. In particular people dispersed during the dry season\textsuperscript{326} and readily left the mission for extended periods to trade with the Japanese pearlers as “in exchange for fish they received several pounds of tobacco, large quantities of rice, flour or sugar and sometimes liquor”\textsuperscript{327}. Later when an economy developed based on traditional commodities, people readily left the mission.

6.5.4. Crisis of protection policy

As European settlement extended across the NT, infectious diseases against which people had little immunity, impacted on people congregated on the missions. Epidemics of measles, influenza and typhoid are documented in MOM documents, oral histories and government reports\textsuperscript{328-330}. 1930 was considered a year of particularly “dreadful sickness” at Milingimbi mission and “a dozen deaths, mostly young children” occurred from epidemics of measles, diarrhoea and whooping cough\textsuperscript{328}. At this time, missions were not equipped with dispensaries and the government required the mission to pay for all drugs issued\textsuperscript{328}. The Elcho Island mission with a population of up to 1000 post World War 2\textsuperscript{331} did not have a nurse on staff until 1949.

Out of necessity, providing for the physical needs of people continued to take precedence to the churches evangelical work, and more responsibility was placed on missions by government to advance the physical and material position of people, with grossly inadequate funding and no positive policy guiding intervention. The
MOM urged the government to put in place a definitive welfare policy and stated that: “otherwise the race will be utterly demoralised, and in the process of degradation will drag down many of our own people with it” 332. The mission blamed the government of “parsimony and utter meanness in regard to the welfare of a race that we have dispossessed”332.

This was expressed by the MOM district chairman in 1933:

It must be said and said definitely, that no-where in the world does a government do so little for the native people under its care as does our Australian government; and we must wipe out this reproach from our nation by a new and well thought out policy of help for these people whom we have so ill-used333.

The personal relationship missionaries developed with Aboriginal people over time, started to influence the missionaries viewpoints. By the mid 1930s, Webb, who was particularly influenced by the Reverend and influential scholar, Dr A.P. Elkin, Professor of Anthropology, University of Sydney, expressed disillusionment of the efforts of the MOM and believed that real progress was going to require a concerted effort by both the mission and the government. Webb believed that the “tragedy and poverty” of the mission work was related to non-Aboriginal people not being aware of the “tremendous difference between the racial, cultural, social and spiritual inheritance of these people”. His view was that the missionary-in-charge was forced into a position of benign despotism due to being responsible for food supply, housing, hygiene, employment and so on. In discharging this responsibility and being “anxious to see the elevation and development of his people”, Webb believed that the missionary may “be guilty of far too much repression and coercion”334.

In achieving reform, Webb believed that “a real and intimate friendship based on mutual respect was essential” and that this “could never be acquired without an understanding of the racial and cultural inheritance” of the people. Reform he wrote “should be commenced from their position rather than from ours”334. Webb outlined 8 steps of development to “help [Aboriginal people] toward their individual and racial salvation”.

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These were to:

- “Win confidence affection and respect
- Enter into spiritual and mental worlds
- Perceive benefits and advantages of change
- Explain again and again
- A step at a time
- Development as a result of their own volition
- Understand that progress will be slow
- Change will represent something deep and real in their lives”334

These steps of development later became the basis of the mission policy endorsed in 1940 (Appendix 3, p 422-423). To respect and not to interfere with the culture of the people was considered a main feature of missionary policy335,336. The tension however of not interfering and yet assimilating, is suggested in the following statement made in 1962: “general restlessness, a certain lack of discipline among the young men and reversion to old customs, still exist”337. Dr Cecil Cook, Chief Protector of Aboriginal people from 1927 to 1939, on the other hand, believed that retaining Aboriginal culture and civilisation were not compatible, and that the salvation of Aboriginal people would be their abandoning of traditional practices and accepting Whiteman’s way of life. Cook proposed that the Bagot Aboriginal compound in Darwin be developed as a training centre where people would learn to adapt to a new social order without interference of culture297.

6.5.5. Work for reward

By the end of the 1930s, protection policy was in crisis293. Aboriginal people were not becoming extinct on contact with European settlement as predicted and efforts to “civilise” did not appear to be successful. Indeed, rationing as a key instrument of protection policy was viewed as corrupting and pauperising without achieving its end of individual “work for reward”. The notion of individual “work for reward” was to be restructured with the announcement of the 1939 Commonwealth government’s “new deal” for Aboriginal people338. The aim of this new deal was to raise the status of Aboriginal people so that they would be entitled to the ordinary rights of
citizenship through a process of training. Closer co-operation between government and missions\textsuperscript{339} was sought without an increase in expenditure being guaranteed and the restrictions on Aboriginal people’s rights provided for in the 1918 Aboriginal ordinance remaining unchanged\textsuperscript{304}.

The rationing regime remained, but with an emphasis on training for citizenship. The training of Aboriginal people to prepare for citizenship, which missions were subsidised by the government to co-ordinate, was to take a different form than the training previously undertaken. Missions were instructed by government to establish and develop agricultural, animal, marine and craft industries, and to no longer simply teach the fundamental principle of work for reward, but to provide opportunities for people to “secure a sense of independence and enable them to earn the necessities of life rather than to depend on charity from them”\textsuperscript{340}.

The first unifying policy for the MOM Northern Australian missions, as outlined by Webb (Appendix 3), was amended in 1944 to reflect greater mission and government co-operation. The emphasis was on preparing the Aboriginal population for contact with mainstream society through regulating contact with non-Aboriginal people and training over generations\textsuperscript{341}. Agriculture was still viewed as an important step to a “more advanced mode of living”. This transitory period was anticipated to be a slow process and was expected to require care and patience on the part of the missionary\textsuperscript{341}.

The native, on this view, was to pass in an orderly and in a sympathetically-designed procession from the food-gathering and nomadic stage to the pastoral and horticultural stage, and then, after generations of careful tutelage, he might qualify for our culture and become an artisan, a trader, a scholar, and a citizen\textsuperscript{342}.

Shepherdson commented in 1949: “….make haste slowly, but I feel sometimes we are moving so slowly there is a danger of stopping altogether”\textsuperscript{343}. An assumption of the MOM policy and indeed all policy in relation to Aboriginal people was that Aboriginal people aspired to a Western lifestyle:
a desire for a changed and improved life needs to be awakened in people and for people to recognise that they are involved in a co-operative effort for their own good……these aboriginals need to be taught what are the essentials of a higher standard of living before the material means of it is placed it their hands……they must learn to appreciate the fact that richer rewards are the fruit of self-discipline and endeavour and are not merely the result of increased generosity on the part of the missionary\textsuperscript{341}.

Home gardens were commenced at Milingimbi mission in 1934 and in 1956 at Elcho Island mission, “quite good homes with gardens” were reported by the Government Welfare department inspector\textsuperscript{344,345} Cook disputed the level of agriculture on mission stations as never being sufficient to provide a constant adequate diet. Cook stated:

Now, no mission that I ever saw provided any food locally except cassava. They might give somebody a stick of tobacco for bringing in a kangaroo or a big fish or something but generally speaking, without careful thought, I cannot remember a single mission in my time, where they gave real attention to horticulture to the extent that they could feed themselves, except with some damn carbohydrate, like cassava, where they really would go to town sometimes\textsuperscript{297}.

Contradicting the remark of Cook’s was the initiative of the MOM to employ Fijian agriculturalists to support the strategy of converting “nomadic food gatherers” to “settled food producers” and ultimately to reduce mission expenditure by supplementing rations. The MOM employed Fijian agriculturalists as early as 1925 and continued to employ agriculturalists through to the 1980s. The development of the gardens was slow though due to adverse weather conditions and water shortages until the mid 1950s when a water bore was installed for irrigation. By the end of the 1960s, fresh produce was being exported to nearby missions.

Mission residents provided labour for the mission in herd keeping, gardening, saw milling, domestic labour, timber hauling, and crewing of mission vessels (among others). The mission however was not able to provide supervised employment for all mission residents, nor did it have the means to provide for the complete dietary requirements of mission residents. ‘Work for reward’ was extended to products
produced within the traditional economy without supervision. Rowse coined this enterprise “mercantile evangelism” where the missionaries did not reorganise the labour process, but mediated the products produced\textsuperscript{293} (p 89). Traditional foods were traded for rations and later cash, as were other commodities valued in the mainstream economy such as shells, mats, baskets, curios and paintings.

6.5.6. The beginnings of a mission supported trade economy

Whereas previously, the missionary view was to consider traditional practices as inferior to European concepts of food production, in a later context as the missionary adapted to the Aboriginal way of life and circumstances, the traditional economy was given an important place in the mission economy. The mission however attempted to maintain an element of control over these activities. For example, the women participated in pandanus weaving of mats and baskets under the supervision of the wife of the superintendent\textsuperscript{294}. For other activities however, missionary intervention in the production process was not possible.

The mission viewed hunting and fishing as valid occupations and paid people via rations and cash to provide traditional foods for mission use. Later during the era of assimilation, when government subsidies were available for developing industries and co-operatives, a fishing industry developed based on cultural understandings of relationships and traditional modes of production\textsuperscript{335}.

Both the trade and nurturance models of reciprocity coined by Rowse\textsuperscript{293} were in practice between the Elcho Island missionaries and the local people. In the early 1930s, the beginnings of a trade economy emerged where tobacco was used as a form of currency and could be saved and traded for items available through the mission, such as tomahawks, fishing line, and knives\textsuperscript{346}. The trade economy developed post world war two after Aboriginal people employed by the armed services on the RAAF base at Milingimbi and several RAAF camps in the Arnhemland reserve had experienced cash in return for services.
Shepherdson, in 1950 received a message stick from the people of Buckingham Bay indicating they had crocodile skins they wanted to trade for cash, not rations. Shepherdson, had built his own aircraft in 1936 to service the missions and took supplies with him to the homelands, which people could then purchase with the money exchanged for skins. The opportunity for trade discouraged people venturing into Darwin for employment or recreation, which both the mission and government were eager to avert. Post world war 2, the MOM became an advocate for supporting people on their native lands, long before the homelands movement was embraced by the Whitlam government in the mid 1970s as a strategy of self-determination to support Aboriginal autonomy and self management.

By the 1950s it was evident that people were encouraged by the mission to remain on their homelands and trade with the mission rather than be centralised and receive rations. Shepherdson was keen to demonstrate Aboriginal occupation of the land due to increasingly intense mining exploration in the Arnhemland region. It was a fortuitous blend of Aboriginal people desiring autonomy and the passion of the superintendent for flying that resulted in the MOM actively supporting people to return to and continue to live relatively autonomously whilst being able to seek medical help and trade goods with the mission. The extended role of the mission as a trade depot is evident from the following quote from an interview:

When I was growing up we used to get ration from our parents. Not like today where we go to the shop. The ration was our supply and would last us overnight. In those days we would still get natural foods like yam and other foods. Galiwin'ku community was all bush. There was a lot of rock. We used to go and collect bandicoot in the area near the clinic where people are living now. That was the hunting ground. We didn't have cars and people could walk from Galiwin’ku to Bible Camp or even to the end of the island. To get supplies from Galiwin’ku, people could walk from the end of the island, Gawa or even Maningrida, get what they needed and then go back. They would come to Galiwin’ku to get sugar and cigarettes. They would exchange shell or some artefacts with the missionaries for sugar, tea and log cabin. They were fit to walk those distances and did not have to carry water. They knew where all the water holes were (Elder man speaking, 2004).
Thomson having lived with Aboriginal people for two years, in his diaries referred to the loyalty and unswerving devotion to duty, that Aboriginal people would give in return for respect and confidence. In developing relationships with Aboriginal people, an understanding of reciprocation between the Aboriginal people and the missionary had begun to develop.

6.5.7. Assimilation and managed feeding

From 1937, the NT administration set up a net-work of settlements in which to train Indigenous people for citizenship. Cook reported various methods of feeding on government settlements from communal feeding three times a day to the weekly distribution of dry rations. The assimilation era was intent on modifying these various regimes through closer supervision. Assimilation was introduced as a direct policy objective in 1951 by the Commonwealth Department of Territories. Training for citizenship had been an assimilation strategy since 1939, however, World War 2 hindered implementation. The central aspiration of the assimilation policy was for Aboriginal people to live and be treated like white Australians in the course of time.

The 1953 Welfare Ordinance which was eventually gazetted in the NT in 1957 removed specific mention of Aboriginal people in legislation. Legally, Aboriginal people were entitled to citizenship under the 1948 Commonwealth Citizenship and Nationality Act. Under the Welfare Ordinance however, the Director of Native Affairs held the citizenship rights of each Aboriginal person. Where a Director deemed it was in the best interest of a ward, a ward could be taken into custody and kept within or removed from a reserve or institution. The Welfare Ordinance stated that “a person would be declared a ward if that person by reason of: his manner of living; his inability, without assistance, to adequately manage his own affairs; his standard of social habit and behaviour; and his personal aspirations; stands in need of such special care or assistance as is provided for this Ordinance”. What followed was a blanket gazettal of wardship of all Aboriginal people of full descent with few exceptions.
The Hon Paul Hasluck, Minister for the Department of Territories, in an address to the Missions Conference in July 1961, stated that there would be no future need for missions and settlements as people integrated with wider society over several generations. Managed communal feeding was a key instrument of the assimilation policy. The reasons for managed feeding were to serve the purpose of: inculcating European eating etiquette; ensure ‘work for reward’ through supervising the distribution and consumption of food; minimise food redistribution among non-workers in the family camp; and as a health measure. While for many Aboriginal people, early government intervention had seemed relatively benign, authorities now wished to actively intervene in people’s lives. Training - in eating habits, literacy and numeracy, house-care, hygiene and employment - was the tool to bring Aboriginal people into Australian society.

6.5.8. Nutritional assessment of rationing

Prior to active intervention to assimilate Aboriginal people, interest in the rationing system had been intensifying. An increasing understanding in the field of nutritional science led to a heightened interest in food surveillance and assessment of dietary nutritional quality against standard recommended dietary intakes. A dietary survey of Northern Australian households was conducted in 1949. A dietary pattern similar to that of wider Australia was reported for non-Aboriginal households. However more meat was consumed than in wider Australia and on average households spent more on food.

The biggest factor affecting the nutritional status of the Northern Australian non-Aboriginal population was reported to be availability and quality of fruit and vegetables, particularly in areas where locally grown produce was not available. Among the ten households of mixed ancestry (noted to not be representative of this population due to the small number of households that participated) principal foodstuffs were bread, tea, sugar, meat, potatoes, onion and jam with very little fruit and vegetables consumed. Lack of money, and ignorance of nutritional requirements, rather than food preference, were perceived as reasons for an inadequate diet among these households.
In 1949, the nutrition adviser to the Native Affairs Branch of the NT Administration, Ms Cherie Lois, visited all government settlements, several missions and a few cattle stations to report on the nutrition of the Aboriginal people under the control of the Native Affairs Branch and to recommend ration scales. An earlier report in 1948 to the Director of Native Affairs by the Institute of Anatomy, Commonwealth Department of Health, indicated that the standard government ration was inadequate for some age-groups, particularly pregnant women and children in almost all factors considered – calories, protein, calcium, iron, vitamin B and vitamin C. The funds provided by the government for maintenance of settlement residents was half of the amount recommended by Lois to achieve a satisfactory diet. Lois reported that:

the present rations issued and the type of meal served on most settlements imply that the aboriginal needs no more than the barest essentials to exist and that he is not expected to be capable of or needing or appreciating anything better, now or in the future.

Recommendations made to Government as a result of the survey were that: only children and workers be provided with cooked meals where communal feeding is the custom and non-workers receive only dry rations; government expenditure on rations be doubled to provide a diet in line with recommended dietary intakes; cooking equipment and facilities be improved to enable large scale cooking; and a catering officer be recruited to oversee operations. Action proposed by the government in response to the survey was to obtain adequate dried milk for purchase; to build up herds of milking goats; and to institute a planting program on government settlements to increase vegetable production to 300 tons to meet the recommendations. However, increasing vegetable production to the level required for optimum dietary quality would have required a huge undertaking, considering reports of unsuitable terrain for gardening on settlements and missions and inadequate water supplies. Missions visited during the review were reported to provide better than the present standard ration, although there was room for improvement. Missions in East Arnhem Land were not included in the review.

In the Port Hedland area of Western Australia, Aboriginal people had expressed dissatisfaction with working conditions including the inferior quality of food
provisions. Expressing common contemporary views concerning Aboriginal people, Lois commented:

We have no reason to believe that badly prepared, sloppy and tasteless food is any less monotonous to the native than to ourselves. Although I have heard the traditional belief that the native is quite happy as long as he has beef and bread expressed often, it has, in every case, been part of a general attitude towards the aboriginal, not of particular experience. In fact on further questioning, it was often admitted that when fruit and vegetables were available they were welcomed by the natives, and that they did like butter, or cheese, or tomatoes.

In 1951, Winifred Wilson conducted a dietary study of five settlements, six missions and six cattle stations and reported that ration recipients were seldom overfed and for some periods were short of food. The main items in the Aboriginal persons’ diet were flour or bread, meat, sugar and tea. The consumption of cereal foods was reported to be twice that of wider Australia, meat was 30% higher than that in the average Australian diet, the consumption of sugars was higher, fruit and vegetable consumption was less than half that of wider Australia, and the consumption of eggs, butter and other fats was extremely low.

Although the observation was made that people seemed to like fruit and vegetables, no foodstuffs were produced locally in sufficient amounts to provide regular supplies for all the settlement or station residents. A newspaper article titled “Claims N.T. Natives not fed properly” appeared in “The N.T News” in 1954 as the result of the study by Wilson. This newspaper article quoted Wilson condemning the government for making little provision for the special needs of pregnant women and children and supporting assimilation as a viable long term aim for the “complete change of habits and outlook”. A recommended strategy to immediately remedy diet was the fortification of flour with calcium.

6.5.9. Increased surveillance of managed feeding

Cook, in the position of Director of Health, reported in 1950 that “strict supervision of diet is long overdue in settlements” and highlighted the unsanitary conditions of
missions and settlements. The MOM was defensive in response to Cook’s reports considering that his first visit occurred after 13 years of being in the position of Chief Protector and was short in duration (less than three hours)\(^\text{357}\). In the same year, the Conference of Health and Native Affairs Officers, resolved to develop and implement a ration scale to facilitate the “policy of cultural assimilation of the Aboriginal people of Australia”. A provisional ration scale for the feeding of Aboriginals was issued to managers of missions, government institutions and pastoral stations\(^\text{358}\) (Appendix 5, p 432-434).

Two factors were said to underpin implementation of the ration scale: that cultural assimilation would involve a gradual transition from foods and methods of cooking at present accepted by Aboriginals to those of white Australians; and that the proportion of meat to vegetable foods was higher, as animal foods were easier to obtain than vegetable foods, and a larger proportion of the calories of the Aboriginal’s diet was derived from animal protein than was the case with European diets. At this stage it had not been resolved among “experts” if the nutritional needs of Aboriginal people were different to non-Aboriginal people. It was suggested that Aboriginal people had adapted to a nutritionally inferior diet \(^\text{352,353}\). Compliance with the recommended ration scale was only thought to be possible with a “complete scheme of communal kitchens and dining rooms in operation\(^\text{359}\). Dining shelters with tables and chairs and cutlery and crockery were recommended to “encourage the acquisition of conventional eating habits”\(^\text{358}\).

Mr Harold Giese, the Director of Native Affairs, NT Administration 1954 to 1968 oversaw the implementation of communal feeding as a strategy of assimilation:

….I have a responsibility to see that all Wards on Settlements are properly fed and clothed, and for this purpose basic rationing scales have been laid down. If through under-rationing, or for lack of feeding in accordance with the ration scales, deaths through malnutrition or epidemics might occur, you will realise the difficult position in which I, as head of the Branch would be placed, not only by criticism from outside sources but from within the Department itself\(^\text{360}\).
Unsubstantiated statements in relation to the impact of assimilation on health and nutrition were made in Government reports. For example, the Northern Territory Annual Report for the period 1st July 1955 to 30th June 1956 reported that with particular attention being paid to diet and preparation of food by the Welfare branch during the year, “there had been a decided improvement in nutritional standards throughout the Territory and the marked cases of malnutrition once seen are now a rarity”\textsuperscript{361}. The following year however it was reported that: “investigations into anaemia and malnutrition in Aboriginal children continued during the year and a clearer picture of these conditions is emerging”\textsuperscript{362}.

Malnutrition is now regarded as a most serious medical condition and the most frequent cause of death (either directly or indirectly) among aborigines in the Northern Territory……..A system of weight cards to record the weights of children graphically for the first five years of their life has been introduced. Increased attention is also being given to the ante- and post-natal care of mothers, particularly in regard to extra dietary requirements and the supply of iron, calcium and vitamins during the periods of pregnancy and lactation. Iron and vitamins are also supplied to young children\textsuperscript{363}

Implementation of the government policy of communal feeding was variable. The ration scale was criticised, as it did not provide for traditional foods considered to contribute substantially to people’s diets, it did not differentiate between differences in the food supply between the coastal and central regions, nor did it consider the logistics and practicalities of ensuring adequate supplies to remote areas. In 1956, the NT Medical Service Divisional Dietitian, Ms Margaret Corden, reported that on the Hooker Creek settlement in Central Australia, supplementary rations for mothers, babies and small children (if they reported for it), and cooked midday meals, were provided for workers and children and “anyone who cared to come to the kitchen”\textsuperscript{364}. On the whole however, it was reported that “the natives prefer to cook and eat their meals at the camp”, rather than attend the kitchen\textsuperscript{364}.

In endeavouring to establish communal feeding and control people’s diets and eating habits the government had not adequately considered the logistics of the catering operation, pest control, storage, an efficient ordering system, and agricultural
initiatives to supplement the food supply on government settlements and missions. Under-rationing or no rationing due to inadequate stock control was common. Evident from reports was the institutionalisation of a poorly financed and coordinated operation by government to cater and provide for the nutrient needs of over 15,000 “wards” scattered over the territory. The annual government report in 1958, reported that lack of suitable cooking equipment and trained kitchen workers on settlements had presented problems in providing suitable meals for mission residents. This was stated seven years after recommendations were made by the Commonwealth Health Department to address these issues.

It is evident from people’s comments in oral histories that communal feeding was not unanimously supported by people working on the ground in missions and government settlements, or by the recipients. When opposition was voiced regarding communal feeding, Geise threatened to review future government subsidies if compliance was not assured. Mr Ted Egan, whom was the superintendent of the Yuendemu government settlement that oversaw about 1000 residents in 1959/60, had been able to implement a “no work, no tucker policy”. He recalled clashing with Geise over the implementation of communal feeding and commented in an interview:

No-way in the world am I going to open that kitchen and have Aboriginals lining up for 3 meals a day…..it disrupts their family life and it’s just crazy to take people away from the responsibility of cooking. I’d seen these kitchens on other places and they were cockroach infested, bloody dumps.

Mr Gary Stoll, superintendent of Hermannsburg Mission in Central Australia, also opposed the communal feeding of all mission residents and recalled a confrontation with Geise who insisted the mission feed all residents three meals a day after the government had installed a kitchen and dining facility.

Throughout the 1950s and 1960s, the government endeavoured to effect tighter regulations on the feeding of Aboriginal people under their charge, through the appointment of kitchen supervisors, a catering officer, a catering guide, menu regulation and stock records. In spite of these efforts, compliance with the
government ration scale was never satisfactory and the system of community feeding was fraught with problems.

By 1969, families were being encouraged by the government to purchase their own food stuffs with money received from the training allowance scheme and to purchase a midday meal for their children from the settlement kitchen. Following the dismantling of food provision in the early 1970s, issues in relation to adequate store infrastructure to sell perishable foodstuffs, and adequate household storage and cooking facilities, emerged as major issues influencing people's dietary intake. At this stage, many Aboriginal people on missions and settlements were living in makeshift temporary shelters and did not have facilities for hygienic meal preparation.

Commencing in 1951, annual government inspections of mission and government settlement feeding facilities occurred. Information from these reports and other archival material in relation to the Elcho Island mission and the food supply is presented in Appendix 4 (p 424-431). The following section seeks to consider the role of Aboriginal agency in the context of managed feeding at Elcho Island mission. Government inspection reports and archival material provide evidence that despite the intention of influencing eating behaviour, an active Aboriginal domain prevailed in relation to nutrition and food acquisition, as Rowse demonstrated for Central Australia. People participated actively in maintaining their nutritional health. However this was severely compromised by impoverished living conditions as a result of centralisation, and a half century of inadequate government and mission funding.

6.5.10. The MOM and dietary intervention

Traditional food

Hasluck partly based assimilation policy on an assumed inadequacy of Aboriginal people, although the intention of the welfare ordinance was to remove discrimination of Aboriginal people and enable their individual participation in wider Australian
society. In view of previous information presented in this chapter, the following statement demonstrates the degree of ethnocentrism and misguided generalisations about Aboriginal people that underpinned policy:

Except in pastoral pursuits few aborigines have developed skills they can capitalise within the white economy; few appreciate social requirements and observances, of health necessities; few have names of their own by which Europeans can distinguish them; in their natural state, aborigines have no means of storing or preserving food; in times of drought and flood their diet is inadequate and uncertain, malnutrition is common; they have no knowledge of the causes of and very limited means to combat disease368.

At the time when reports on nutritional intake were being published in the late 1940s, the contribution of traditional foods to people’s diet was generally considered not significant by the non-Aboriginal authorities. Aboriginal people were thought to rely on issued rations for most if not all of their food supply353:355. However on examining reports, the role of traditional foods is certainly worthy of revision. In an assessment of diets on the mission stations by the nutritionist with the scientific expedition team to Arnhem Land, Margaret McArthur frequently made reference to the role of traditional foods:

[in reference to week-end food gathering] At Yirrkala the men went fishing, or less often they hunted for wallabies; the women and girls gathered vegetable foods, and practically all of the women left the camp353 (p 19).

Some, but not all, of the women who were not rationed by the settlement went out each day to forage for native foods353 (p 25).

There are no available reports on the actual contribution of natural food sources to people’s past or contemporary diets on Elcho Island mission. McArthur was concerned that the situation of inadequate rations on mission stations was exacerbated, as she believed rations were the major source of food. However her references to the use of natural food sources indicate that traditional foods played a significant role in people’s diet353. Considering the nutrient density of traditional foods in general, week-end consumption alone, would have contributed significantly
to the total diet. Despite the inadequacy of the rationed diet, no nutritional deficiencies were documented by the scientific expedition. Other available dietary surveys of mainly government settlements, several cattle stations and missions, make mention of foraged and hunted foods, but dismiss the contribution of these to people’s diets.

In 1956, the dietitian for the Department of Welfare reported for Milingimbi mission, that natural foods made up the nutritional inadequacies of the provided diet, excepting calcium. In relation to Elcho Island mission, there was not only frequent mention of the critical role of traditional foods in people’s diets by the Aboriginal people interviewed as part of the present study and in oral histories and government and mission documents reviewed, but local mission industry, such as the fishing industry, was based on natural food sources. The government inspection report of Elcho Island mission in 1952 reported that “many of the able-bodied population spend much of their time gathering native food” and similarly “children not attending school collect considerable quantities of native food.”

The contribution of traditional food to people’s diets was considered by study interviewees to markedly decline in the 1970s with wider access to cash through the government training allowance scheme which was extended to missions in 1970 and later unemployment benefit (which people did not receive until 1976), and the concurrent development of the store. Initially in the establishment of the mission, the women, accompanied by their children, provided foraged foods for the men employed by the mission. The men also participated in food procurement in their free-time. Gradually the time available for subsistence food procurement diminished with various government and mission policy changes over time. For example, the commencement of formal western-style education in 1953 monopolised a proportion of the time children had previously spent with their families gathering food. The expansion of mission industry in the late 1960s, opened opportunities for wider female employment, thereby decreasing the time available for women to participate in subsistence activities. Contributing to diminishing participation in subsistence activities was the need for people to travel further from the immediate mission vicinity to procure foods, due to population pressures on the land. The population of the Elcho Island mission had nearly tripled in twenty years, from 250 in 1944 to 700
in 1965. An anthropologist, Annette Hamilton, while living among Aboriginal people on their homeland in the mid 1970s observed the diminishing time available, to women particularly, to participate in traditional food gathering.  

Food production and mission industry

A reduced capacity for procuring traditional foods resulted in an increased demand on the mission to provide adequate food and thereby more people having to be involved in mission activities to raise revenue for the purchase and production of food stuffs. The remoteness of the mission, inadequate infrastructure for storage, lack of refrigeration (until the mid 1960s) and the variability of local garden produce, meant that the mission could not consistently provide for the nutritional needs of the population for whom they had been granted responsibility by the government. This is evident from an account of a typhoid epidemic in 1968 when the mission struggled to provide meals for the numerous sick. Fish traps had to be installed to catch adequate fish and extra rations were ordered through the government.

Mission residents were encouraged to hunt and fish so as to provide fresh produce for the prepared meals, residents were employed in the mission garden, in the shepherding and milking of the goat herd, and women were employed to prepare the meals for the school children, aged people and employed. After establishment of the Elcho Island mission, several families returned to their homeland to establish their own gardens and provide garden and hunted produce to the mission. Similarly several families within the mission had established their own family gardens and were producing some of their own produce. Indeed not only did people supplement their nutritional needs, they communally contributed to the development of the mission through raising mission revenue through timber hauling and saw milling, fishing, gardening, curios, paintings and crocodile skins which reportedly fetched £25 per skin in the 1930s. The participation of people in the mission and traditional economies is evident in the following report of Gordon Sweeney, who in 1940 was a Patrol officer with the Native Affairs Branch of the Northern Territory and ex-missionary with the MOM:
The general policy of encouraging the natives to live and work in their areas, of no free issues except to sick, aged and children but opportunity for all able-bodied to earn money if they so desire, the regular pay day when the people handle their own earnings and the local “bank” and trade store stocked with useful and desirable articles is proving a practical and sound policy. However there will be some loss in Child Endowment revenue for the mission as children will tend to stay with their family groups who work in their own areas. Child endowment figures for the Elcho Island reflect this aspect 373.

**Communal feeding**

Supervised feeding of children was recommended by Lois in 1949 to ensure that children receive “proper food and as an educational measure”352. It is evident from available data that communal feeding of the entire Elcho Island mission population did not occur. Dry rations were provided for children, the aged and infirm, and mission employees from the commencement of the Elcho Island mission to the late 1960s. The ration system was dismantled for employees in 1964. Until 1955/1956 with the construction of a kitchen and dining room, from corrugated iron and locally milled cypress pine, meals were prepared in the camp by family groups. Breakfast was prepared in the camps by families throughout the mission era.

After construction of the kitchen, meals were prepared for children, the aged and infirm, and mission employees. Firstly, when adequate fish or beef was available, a midday meal was provided to those entitled to rations. By 1959, children received a cooked midday and evening meal and a twice daily issue of milk. Adults returned to camp with their allocated food, whereas the children’s meals were supervised in the dining area. The number of meals received by children seemed to vary over the years, and in 1966 it was reported that only the midday meal was provided for school children. The workers were expected to pay for their meals from 1959, as in 1956 part wages were paid to workers employed by the mission. After establishing structures to supervise feeding external to the control of the family, by the late 1960s, with cash starting to replace rations, the government’s position was to encourage the formation of the self-supporting household based on a nuclear family293.
The 1966 government inspection report for Elcho Island mission stated:

communal kitchens are discouraged to try to develop responsibility and unity within the individual families. However, a communal kitchen and dining room is organized to supplement and feed babies and to supply the midday meal for the school children. This is under the supervision of the home craft instructress.\(^{367}\)

**Infant and child feeding**

The Commonwealth Government passed legislation in 1942 where child endowment was paid to mission stations collectively, to provide food and clothing for each child. A dormitory system for children was never put in place at Elcho Island, although Milingimbi had set up a dormitory system for children. The government reported in 1944/45, that provisions for child endowment had led to noticeable improvements in the “diet and general welfare of native children”\(^{374}\) although no data was routinely collected to verify this. In 1947, after visiting the northern Missions, Professor Elkin called for maternal and child health nurses to be employed on missions, and special diets for women and children to be introduced\(^{375}\). Cook had established antenatal and infant welfare clinics on Bagot compound in Darwin, where infants with malnutrition were removed from camps and placed under the control of the nurses\(^{297}\).

Epidemics of gastroenteritis and other infectious disease, such as measles and whooping cough, that may have contributed to malnutrition and infant mortality, were reported on Elcho Island mission. It is not clear however if supervised feeding was justified on the grounds of poor infant and child nutrition. Before the era of infant clinics, babies had been described as plump and as having their every whim attended to\(^{376}\). The babies less than two years of age examined on four mission stations in Arnhem Land (one of the four being a MOM mission) by the 1948 American Australian Scientific Expedition to Arnhem Land were described as plump. A growth curve based on the weights of sixteen babies over twelve months on one of the mission stations studied, showed rapid growth for the first five to six months, after which growth slowed compared to non-Aboriginal Australian children\(^{369}\). The expedition team estimated an infant mortality rate of 127.1 per 1000 live births. Infancy was defined as the period up to the age that a child begins to
walk. Reasons for such a high death rate could not be ascertained by the expedition team.

The infant feeding practices of Aboriginal women of prolonged breastfeeding, breastfeeding on demand, breastfeeding throughout pregnancy and sharing food from the same bowl were considered primitive practices. Infant feeding bottles were introduced on missions so that nurses could supervise the feeding of “underweight” or sick infants. In hindsight, these were likely to have contributed to, rather than prevented, infant morbidity and mortality. The Welfare Department Dietitian in 1956 recommended supervised infant feeding on Hooker Creek government settlement, to improve the diet of the Aboriginal residents and “teach mothers to wean their babies”. This recommendation was based on the observation that the breastfed infants up to 7 and 8 months were very healthy looking babies, but many of the children over two appeared stunted in growth. Certainly in 1934 in North East Arnhemland, the need for dietary intervention did not seem apparent according to Webb’s observation regarding infant feeding:

babies are nursed by their mothers until they are up to four years of age, and during that period are extremely plump and soft fleshed…….great affection is shown by both parents for their children, who are rarely corrected, and whose every whim is responded to.

By 1949, at Milingimbi, all babies under 4 years of age were weighed once a week and issued with milk or milk foods. Weighing was organised around the women’s shell-gathering times. Those who needed it were given special care and feeding. An infant welfare clinic was established at Elcho Island Mission in 1949. Maternity allowances were paid to missions in 1960. Supervised infant feeding commenced in 1961 on Elcho Island. Provision of meals and supplementary feeding for infants and toddlers did not commence until 1965. Two meals a day were usually provided for babies 4 months to toddlers, and later in the year, three meals a day with the opening of a 30 bed hospital facility. Pregnant women and mothers with newborn babies were expected to attend feeding sessions at the mission hospital until the baby was one month old and considered to be doing well. These sessions were not always well attended. A reason the mission saw for supervising child feeding
was the concern that small children were not getting their share of rations distributed for preparation in the family camp (Interviewee 2005).

**Quality of the rationed diet**

It is difficult to assess the overall quality of the diet provided at Elcho Island mission with the scant information available. Reports suggest that there were concerns about the nutritional adequacy of the rationed diet in the mid 1950s. There had been a succession of epidemics and it was thought that “a concerted effort was needed to ensure an adequate diet of nourishing food for the growing population”, hence a bore for irrigation was planned to increase the garden produce. Up until 1950, agricultural development on Elcho Island mission had been slow. An inadequate water supply and adverse climatic conditions challenged the ability of the mission to provide a reliable and adequate food supply for residents. For example, McArthur, the nutritionist with the American-Australian Scientific Expedition to Arnhem Land, reported in 1948 that at the Yirrkala mission sweet potato was the only vegetable in storage included with the rations, due to a severe cyclone destroying a large area under cultivation. Mr Penaia Sati, a Fijian missionary and agriculturalist began work at Elcho Island mission in November 1950. A severe cyclone in 1951 destroyed the gardening efforts of Mr Sati. Garden production on Elcho Island mission increased markedly after 1955 with the installation of the bore. Over ten years later, in 1968, garden produce and fish were distributed among the residents and exported to other missions. In the 1970s, surplus garden produce was sold around the township from a trailer towed by a tractor.

Fresh foods such as garden produce and hunted game were not always available for communal meal preparation. For example, the government inspection report of Elcho Island mission in 1959, reported that due to a shortage of fresh produce, only dry rations were issued every meal. It is difficult to assess the significance of this shortage. That fish was being exported to Darwin from Elcho Island in the same year, suggests that the shortage may have been short-lived or that the fish was being sold rather than used locally. The remains of the fish after filleting however were generally used to prepare hot meals.
Two years prior to the dismantling of the ration system for employees in 1964, the MOM board resolved to seek scientific advice for improved feeding, due to what they perceived to be pressures from outside political groups and “a definite desire to improve the ration distribution system”379. In the same year, government officials reported that the mission was not complying with the minimum ration scale for the aged and infirm. There was concern that “there could be occasions, judging from the state of the store and when the vegetable gardens are not producing, when difficulties could be experienced in providing sufficient food for these groups”380.

Crisis of managed feeding

By the mid 1960s, with a population of more than 700 people the expectation on the mission for assimilating Aboriginal people and preparing them for citizenship was unfolding. Staff shortages, inadequate funding and an urgent need for infrastructure for health, hygiene, sanitation, electricity, housing and water supply381 were considered major factors stalling the process of civilisation:

Nowhere else does a mission have to assume such a large degree of concern for the economic life of the people – changing their mode of living from nomadic to settled, affording training in agriculture, animal husbandry and industrial pursuits, and guaranteeing the food supply for the whole community during the period of transition382.

The mission blamed the government for lack of financial support and in turn the government treated the complaints of the MOM as inappropriate excuses. A handwritten comment, marked confidential, by a government welfare officer commented that:

Methodist missions are generally and actually ……taking no notice of health department recommendations. This is not because they disagree with the Health Department’s recommendations but because it is not suitable or convenient or other local reason. Local reason is in some cases subconscious feat of inference with their personal positional aggrandisement. Instances may be seen at each MOM mission. The excuse of no finance, nor staff, is no longer acceptable……383
Government inspectors abhorred the insanitary and impoverished conditions that people throughout the NT were expected to dine in communal kitchens. A welfare inspector reported in 1964:

The most consistent complaint on the settlements and missions is the manner in which kitchens are maintained. It cannot be said that any of the kitchens are maintained in a clean and sanitary condition at all times. Many of these settlements are serving over 1500 meals a day. It was only in 1962 that the kitchen facility at Elcho Island mission had a hot water system installed. Prior to this it was reported by the government inspection officers that powdered milk was mixed by hand for the school children in a bucket and served by cups. Utensils were only washed in cold water. A further report in 1968 condemned the use of the kitchen and dining facility until the foundations were made vermin proof and the kitchen adequately fly screened.

Health concerns

Morbidity and mortality from infectious disease were prevalent at Elcho Island mission in the 1960s. The mission reported to government in 1965 that since 1956, 84 mission residents had died with as many deaths in the under-2 population as in all other age groups combined. The most common causes of death reported were pneumonia and gastroenteritis in the under twos. From September 1967 to May 1968 Elcho Island mission experienced an epidemic of typhoid, resulting in the quarantining of the fishing industry.

The population had increased to 950 by 1968, including 50 missionary staff. Housing and sanitation were appallingly inadequate. Stand taps were provided for washing of individuals, clothes and food utensils. By the start of 1972 with increased government interference in mission activities and a shifting political footing in the governance of missions or evolving townships, the mission was feeling the loss of 8 long-service missionaries and their partners.
By 1972 the missions were pleading for increased government support for capital expenditure:

Staff shortages, particularly of carpenters/builders, mechanics and secretaries have hindered development. Teachers, nurses, social workers, electricians and plumbers are needed, while urgent matters await attention of health officers and work organisers. Every effort is being made to fill staff positions with Aboriginal people, but only a very limited number are yet qualified. No increase has been made in rates of training allowance since they were introduced 2 years ago. An urgent review of this system by the government is essential.

Health problems were largely attributed to the fault of the individual person for their ignorance and lack of understanding of disease and lack of cultural adaptation. Twenty years previously, Hasluck had based the assimilation policy of managed feeding on Aboriginal people’s presumed lack of understanding. Assimilation had not rectified this viewpoint. The following excerpt from a government report exemplifies this:

Aboriginal people having a lack of understanding of disease causes and remedies, lack of appreciation of the need for basic hygiene measures, poor understanding of nutritional values in Western-type foods and, sometimes, reluctance to seek early medical help.

Missionary and current Director of the Aboriginal Resource Development Service in the Northern Territory (ARDS), Richard Trudgeon still blames ‘lack of understanding’ as the cause of poor Aboriginal health.

Focusing on instruction of the individual, infant welfare training, home management instruction and cooking demonstrations were reported in 1970 “to have assisted to lift standards of living”. At the beginning of 1972 sewerage schemes were beginning to be installed on settlements and missions and plans for the municipal development of missions and settlements proposed. Missions were no longer viewed as transitory training institutes, but emerging townships. A shortage of housing was stated to be a major problem facing the government administration.
The subsidisation of missions to care for Aboriginal children was regarded as outdated and inappropriate and after 30 years was withdrawn. Families were expected to show the self-support, independence and responsibility that had been denied of Aboriginal people through years of assimilation. Issues in providing an adequate food supply through community stores emerged. Special concern was expressed at the high level of malnutrition suffered by many Aboriginal children and the MOM urged government action to alleviate this and other health problems among Aboriginal people throughout Australia. Rowse remarked that despite the negative social impact of the communal feeding system on government settlements, the switch to low wages and welfare benefits plunged many families into poverty\(^{293}\).

### 6.6. Discussion

This chapter provides a narrative of the development of the food supply in Galiwin’ku community in a context of control and of imposing Western societal values and structure on Aboriginal society. Whilst the lives of Aboriginal people during the era of protection to self determination were irrevocably affected, there is evidence that the people of Galiwin’ku community, throughout their history of colonisation, continued to rely on traditional foods to a significant extent, and in so doing maintained some responsibility for their nutritional needs.

Based on dietary surveys in other mission stations, it is likely that the provided diet throughout the mission era was nutritionally inadequate. However without an assessment of actual dietary intake including intake of traditional foods and garden produce, it is not possible to comment on the adequacy of the diet. The problem of poor diet however was alleviated to a degree by people’s reliance on traditional foods and their contribution to the development of the gardening and fishing industry and raising of mission revenue.

Although it was a deliberate action of government to socially engineer Aboriginal society through the manipulation of its children, it is the perpetuation of this theory of “loss of responsibility for children” that diverts attention from a history of government negligence and continues to disempower Aboriginal people. This
chapter demonstrates that the people of Galiwin’ku community, throughout their history of colonisation, showed initiative and continued to take responsibility for the nutritional needs of their children. Despite measures imposed in the past to influence infant feeding practices and diet, the majority of women at Galiwin’ku breastfeed their children, and continue to breastfeed for at least one year or longer. Few newborns are bottle-fed. Furthermore, after years of children being exposed to supervised feeding and having to sit quietly at a dining table at a prescribed time, practicing European etiquette of using cutlery and eating from an individual plate, Aboriginal people have continued to eat according to their principles of etiquette. Throughout the era of managed feeding, while one set of behaviours applied in the dining room at Elcho Island mission, there was ample scope for children to be exposed to the Aboriginal food domain.

The characteristic dietary pattern documented across remote Aboriginal communities: a diet high in refined carbohydrates such as flour, bread and sugar, and low in fresh fruit and vegetables, has partly been attributed to conservative dietary preferences developed as a result of the colonial policy of rationing128. Rations were firstly used to centralise people, they were then traded for labour and then substituted for social security payments to assist the aged, sick and the children. Of interest is that the amount of sugar, bread and flour included on the 1951 government ration scale (Appendix 5, p 432-434) is similar to the contemporary consumption of sugar, bread and flour shown in Chapter 5. Flour, sugar, rice and tea were the “pioneer” foods and were popular due to their relative durability, inexpensiveness and the simple cooking and storage facilities required for their preparation128. Non-Aboriginal people also relied on these foods in addition to meat, tinned milk, eggs, dried fruits and fresh produce when available. Past evidence that constraints, such as cost, convenience and availability were key determinants of dietary patterns indicates that these factors may still be supporting contemporary dietary patterns similar to the past.

Past government recommendations regarding diet and feeding practices raises the question whether current dietary recommendations carry any credibility with Aboriginal people. In the past where sugar was considered by government as an essential ration, it is now condemned by health professionals. Where early weaning
of infants was recommended, prolonged breastfeeding is now promoted. Where a butter ration was encouraged due to concern for inadequate dietary intake of vitamin A, current advice is to reduce fat intake.

Within the constraints of government and mission control, threaded through government reports and mission commentaries are accounts of Aboriginal actions that continually caused non-Aboriginal authorities to reassess their strategies and position regarding the welfare and rights of Aboriginal people. Throughout this narrative, there is a story of Aboriginal autonomy, where people interacted purposefully within the constraints of government and mission control to shape their present and future. Despite the enormous change Aboriginal people endured, the traditional food system has remained central to Aboriginal life.

The following two chapters presented in this phase of the research will further explore changes in the food supply from the perspective of Aboriginal people and past and current influences on dietary intake and nutrition improvement.
Chapter 7. Factors influencing nutrition: a Yolngu perspective

In this chapter I explore influences on diet and eating behaviour from a Yolngu perspective. People’s perceptions presented in this chapter demonstrate a complex interplay of economic and socio-cultural factors enabling and impeding access to healthy food.

7.1. Introduction

An awareness of factors influencing nutrition is essential in developing interventions to improve nutrition\textsuperscript{391}. Whilst active intervention in the Northern Territory for nutrition improvement of Aboriginal people has been ongoing since the assimilation era, as demonstrated in the previous chapter, little is understood about the influences on nutrition from an Aboriginal perspective. Indeed, beyond the store, little is known in general, about factors influencing the nutrition of Aboriginal people in remote communities and the impact of these on the lives of individuals and families. Anthropological literature provides insights into the complexity of socio-cultural influences on nutrition at the inter- and intra-household level. These insights however have had limited uptake into nutrition policy and practice in general.

How people choose food has been shown to be a multideterminant, context-dependent phenomenon\textsuperscript{392}. Systems/socio-ecological theory provides a model to help unravel the complexity of nutrition behaviour and the multiple influences. As shown in Chapter 2, according to a socio-ecological model of nutrition\textsuperscript{125}, there are four levels of influence on behaviour that need to be considered: the intrapersonal; the interpersonal or social influences; the physical influences or community settings such as the store, school and household; and the societal or macro-influences. In considering behaviour, systems theory poses that it is the interaction and sum of the multiple influences on behaviour that is as important as each of the levels of influence.
As presented in Table 2.1, (Chapter 2, p 32), at the macro-level, both poverty and social inequality are viewed as important contributors to poor nutrition among Aboriginal Australians. Poverty has been identified by Smith\textsuperscript{149} as being an important determinant of household expenditure associated with the commonly documented dietary pattern observed among Aboriginal people of bread, flour, meat, sugar and tea. At the household level, based on the cultural norms of reciprocity, the family unit has been shown to play a fundamental role in economic survival in the context of poverty\textsuperscript{393}.

Further contributing to poor nutrition at the societal level of influence is the sense of powerlessness among Aboriginal people deeply enforced by dominant non-Aboriginal society in the early days of colonization\textsuperscript{38}. In relation to nutrition improvement, this perceived powerlessness is thought to manifest as low levels of motivation, self esteem and self-efficacy at a community and individual level.

The effects of poverty, social inequality and disempowerment are further complicated by a rapid process of social and cultural change that is challenging long held community values and authority\textsuperscript{38}. Aboriginal people’s views on the impact of these factors on nutrition have not been examined. Low levels of employment, income and education and inadequate household infrastructure are considered to further exacerbate the cycle of poor nutrition for Aboriginal Australians.

As stated previously, much of the public health research on influencing factors on nutrition has focused on the physical environmental factors impeding access to healthy food, particularly food cost, availability and quality\textsuperscript{37,51}. Consequently, strategies to facilitate nutrition improvement for Aboriginal people in remote areas of the Northern Territory have focused on improving the store food supply and people’s awareness of the recommended food groups\textsuperscript{45}.

Considering the interest in raising people’s awareness of the recommended food groups and good nutrition, there is little available research on the intrapersonal level factors (the psychosocial, biological and lifestyle factors) influencing nutrition. The factors assumed by health practitioners to influence nutrition at this level as identified in Table 2.1 are: inadequate nutrition knowledge and awareness of
relationship between health and nutrition; access to culturally appropriate nutrition information; preference for fatty meats, sugar, bread and damper; inadequate food preparation skills; limited access to banking and inadequate financial management skills; loss of traditional lifestyle and access to traditional foods; and, inadequate knowledge of consumer rights.

Little attention has been given to the meaning of food and the concept of identity in relation to nutrition behaviour. Particularly relevant to the context of this research, is a study by Thompson and Gifford that found food to represent “powerful symbolic connections to belonging and sense of place and past within the Melbourne Aboriginal community” A key factor perceived to be hindering the effectiveness of public health by the Aboriginal people in the study by Thompson and Gifford, was that the cultural meanings of food and their social context were absent from the lifestyle (mainly food and exercise) risk modification approach taken by nutritionists, doctors and other health professionals.

More information is needed on the context of nutrition and nutrition behaviour to inform nutrition policy and intervention. The strengths of qualitative methods are that they generate rich and detailed data on the perspectives of people based on their everyday lives and experiences. This chapter uses qualitative methods and aims to embed the factors influencing nutrition in a social and cultural context according to the perspectives of Aboriginal people in the study community.

7.2. Aim

The broad aim of this component of the research was to explore factors influencing nutrition and nutrition improvement from the perspective of Aboriginal people living in Galiwin’ku community within a systems/socio-ecological framework that connects the individual to the family and wider community.
7.3. Study design and methods

A prospective qualitative study was undertaken with data collected over a three year period, from 2002 to 2005. An ethnographic approach using a mix of qualitative methods was used to contextualise nutrition and its many influences. Multiple methods were used to ensure completeness of the data. The theoretical orientations used to guide data collection and its interpretations were informed by systems/socio-ecological theory, a Yolngu research methodology and Indigenous values and principles as detailed in Chapter 3, Section 3.2. Ethnographic fieldwork was carried out through frequent two to five week visits to the community over the study period. Approximately twelve months in total were spent in the community over a four year period. Field work included indepth and conversational interviews, family group discussions and participant observation.

A key concern was to avoid imposing a set of pre-conceived influences of nutrition that may not adequately reflect the views and experiences of people in the community.

7.3.1. Sampling

Interviews with Aboriginal people

The ethnographic approach was reinforced with some structured methods, specifically seeking to tap the beliefs and opinions of key community members. In total 12 semi-structured indepth interviews were conducted with Aboriginal people living in the community, 4 females and 8 males. Eleven of the twelve people interviewed were over 50 years of age. One male interviewee was around 35 years of age. The sampling strategy was developed by Yalu’ Marnggithinyaraw and fitted within a cultural sampling framework based on the Yolngu kinship system. Firstly, the 23 language groups represented in the community were grouped, according to relationships, into their respective “ringgitj” [social group]. The aim of this method of sampling was to identify a broad range of views and cultural perspectives. A male and female leader from each ringgitj was identified. In total 16 people were selected...
Interviews with ex-mission staff

Four non-Aboriginal ex-Elcho Island mission staff were interviewed, 3 males and 1 female. A snowball and convenience sampling strategy was used. Three people interviewed resided in or near Darwin. The fourth person was interviewed on a visit to Sydney.

Focus group discussions

Another form of interview reinforcing the ethnography was conducting focus group discussions. Six family focus group discussions and 2 work-place focus groups were conducted over the study period. A total of 40 people aged from 8–60 years participated in the focus groups (Table 7.1). Data collected from these focus groups was also used for the study described in Chapter 8. A mix of sampling strategies was applied. The aim was to identify a broad range of views based on age, sex, educational level, socio-economic status and occupation. Purposeful sampling was used to select three family groups who lived in a section of the community considered to be of lower social position relative to other areas of the community. These three family groups were selected to provide deeper insight into the contextual experience of nutrition for people in the community. The two work-sites were selected based on their direct involvement in health-related activities in the community. Three family groups were selected based on their geographic position in

†† We approached this man at his house. Lawurupa explained to him that we were visiting him as we would like to interview him and discuss a time when this might be suitable. He came out of the house with a sheet and placed it on the ground and gestured for us to sit on it, which we did. We explained the study and why we would like to interview him. He began talking about living on the homelands. I was conscious that maybe we were taking his time and that if he agreed to be interviewed we would come back with the recorder, consent forms etc. We organised a time for the next day and parted. The next day he was not available. An opportunity lost and a lesson learnt!

‡‡ this man was a mala leader, very knowledgeable and with valuable insights into the mission era and developments in the food supply as he followed his father as the “Larrapan” captain (mission cargo lugger) and later was an activist for Yolngu self determination in store management. I was not able to interview him and he has since passed away. Before he died, the community organised a ceremony to recognise his invaluable contribution and commitment to the development of the community.
the community and relationship to the co-researcher. Selection of group participants occurred opportunistically, depending on who was available at the time of the focus group and who wished to participate.

Sampling for both indepth interviews and focus groups continued until theoretical saturation when no new themes or issues were arising from the interviews and focus group discussions.

<table>
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<tr>
<th>Table 7.1 Demographics of participants involved in group discussions</th>
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<td>Group discussion</td>
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<td>Health centre</td>
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<td>Family 6</td>
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\(^a\) 2 young adult men chose not to participate  
\(^b\) 3 children were present  
\(^c\) 2 women chose not to participate

7.3.2. Data collection

Participant observation

Participant observation and guided conversations occurred over the total duration of the study. A field diary was kept and entries were used as an additional source of information to the interviews and focus group discussions.

Participant observation occurred at the wider community level, community settings and household levels, including participation in community meetings and workshops, accompanying families hunting, household cooking sessions and participating in everyday life. Various degrees of observation were required, from passive observer to active participant. A two week field placement for myself to carry out participant observation in the store and take-away was arranged with ALPA and the take-away
proprietor. Data collected during this field placement were mainly collected for the study described in Chapter 9.

The five workshops organised as part of the community development process were particularly informative. These workshops invited workshop participants to present their views and experiences relating to diet and eating behaviour and nutrition improvement. Observations were recorded in detailed field notes.

**Indepth interviews**

Indepth interviews were guided by a theme list that consisted of three main sections; past diet and nutrition; changes in the food supply and impact on diet; foods people currently eat and why. These interviews occurred in different settings as requested by the interviewee – outside under the tree, on the house verandah, on the church lawn bench, or inside the house. Interviews were often conducted in the presence of other family members. Interviews lasted approximately 45 minutes and ranged between 30 to 90 minutes. Participants were interviewed only once. However guided conversations continued to occur with nearly all of the interviewees throughout the study period.

Eight interviews with Aboriginal community residents were conducted mostly in language by a co-researcher (EM) and myself and later transcribed by Yalu’ Marnggithinyaraw and translated by a consultant Yolngu translator. The co-researcher facilitated the interviews where language was principally used and I conducted the interviews where English was principally used. All interviews and focus group discussions were tape-recorded and fully transcribed.

**Focus group discussions**

Focus group discussions lasted on average 30 minutes, ranging between 30-45 minutes. Key themes emerging from the indepth interviews were explored further in the focus group discussions. The focus group setting was also used to identify and explore food preferences. This data was used to develop a study instrument to determine young people’s food preferences, as described in Chapter 8. Data
collected through interviews and focus groups provided an internal validity check to the data collected through participant observation.

### 7.3.3. Data analysis

Data analysis proceeded concurrently with data collection. Themes arising inductively through the process of data collection were explored through an iterative process of inquiry. Emerging concepts were tested through continually engaging with community people and participant observation. After each of the interviews, EM and I (JB) discussed the interview process and reflected on people’s perspectives. Interviews were firstly listened to by EM and translated verbatim to JB. Full transcripts were later provided by a Yolngu translator. As a form of checking the reliability of translations, one interview was transcribed and translated by a second person and the translations compared.

During the post-interview process, emerging themes were discussed and field notes taken to define and check research findings. Themes emerging from interviews were discussed with people in the community through guided conversations as a form of checking the credibility of the analysis. Credibility of the analysis was also established using prolonged engagement, data immersion and peer debriefing.

On completing data collection, interview and focus group transcripts, meeting minutes, reports, workshop proceedings and field notes were compiled. Data items were then analysed using thematic analysis. Similar to the process of “open coding” as used in grounded theory, data items were analysed to identify emerging concepts. Memos were written describing the significant concepts emerging from each interview and focus group transcript. QSR NVivo software was used to assist with management of the interview transcripts and to write memos. Summary memos were written identifying the major issues raised.

The concepts identified were coded and applied to the other additional data items: field notes, reports, meeting minutes and workshop proceedings. Emerging concepts were examined and linked and compared with concepts considered previously.
Salient concepts common to all interviews and data items were listed as themes. Words, phrases and quotes thought to capture the themes were selected and are indexed in the results. Terms used by respondents were used where possible as in-vivo theme codes. As with the constant comparative method used in grounded theory, themes were then analysed to identify patterns and recurring regularities in the data and to look for data that contradicted or deviated from the emergent theme. Data were analysed by hand.

7.4. Findings

“You go back and look at photo of the old Aboriginal people, they are very very healthy people. But when whiteman come they teach us, “you have to live like we are”, but we would like to go in our way, but they said “No, no- you have to come follow us”. Aboriginal people eat always fresh, always bush food and sea food – next morning we go out for more. Now balanda [Non-Aboriginal people] come, they teach us – you get refrigerator, deep freezer, you can save your food in. That yuta [new] way - because it’s bad for our health. Why we Aboriginal people sick now, big tummy, big fat fella. Before we are tall fella and healthy, but now we getting shorter, and big man and little bone. And early days we don’t have sickness, but now we suffering to death because of the food and stuff that we eat.” (George Dayngumbu speaking on “Journey between 2 worlds” by Larry Gray, Mary O’Malley, Michael Balson).

This story, told by a senior Galiwin’ku mala [language group] leader who has now passed away, tells of two different cultural worlds and the imposed transition for Aboriginal people from fresh to stored food and the perceived outcome of this on people’s health. While this quote is rich in meaning, food is given centre stage and is depicted as the cause for ill health, symbolising a way of life far removed from that of the past and pathological to the present.

As opposed to the English concept of food, some Yolngu consider all substances consumed as food, including kava, alcohol, drugs and cigarettes, hence the expression “starving for ngarali [cigarettes]”, used when a person is wanting a cigarette, and the reference to “food and stuff that we eat” in the above quote. Within the narratives collected, it was evident that food symbolised more than
nutrition and health: it symbolised the past, a path or way of life being newly negotiated, a growing individualism, the importance of family, a level of community discord, and a hope for the future.

Food, both Yolngu and Balanda food, symbolises “a way of life” and is situated within the wider context of culture and the environment. The ramifications therefore of not relying on Yolngu food impacts on every other aspect of life. When the older people interviewed talked about food, they worried about the changing attitudes of young people. Similarly to that reported by Thomson and Gifford among urban-based Aboriginal people in Victoria, woven through their narratives were wider concerns about losing connection with the backbone of Yolngu society, the Yolngu food system, and the implications of this on Yolngu society. Present life circumstances were perceived as out of balance. The abuse of illicit substances, poor and biased governance, cultural barriers to economic development, and the breakdown of disciplining structures for children and young people, were identified as contributors to a life out of balance. These social factors were considered by interviewees as critical determinants of nutrition:

All this we see now is a new law, bad things are happening, because of the big township, there’s lots of rubbish. We/I don’t know what’s happening now. But back in the olden days the law was very strict, if anything bad happened in a family the mothers would give good hiding to the kids, yes this story is for you, and it’s a real one. If we started doing a business then people would get jealous. People are being selecting to do jobs, they don’t provide jobs for everyone, that’s what these community counsellors has been doing, they don’t employ much of the young people any more, because what has happened is they are being too lazy to work. Balanda people come here to find jobs, but for Yolngu they are rubbish, in their mind they are not thinking of doing work, they can’t even ask for one. The people who are working are the ones who have been given the opportunity and not everyone else, maybe that’s how the law works. The young boys stay around in camps drinking kava, and the young girls like to sit and gamble all the time. Everyone is lazy, nobody’s thinking of getting jobs (Elder woman speaking, 2005).
The three major themes and sub-themes that emerged from the data are summarised in Table 7.2.

**Table 7.2 A summary of major themes and sub-themes relating to perceptions of factors influencing food choice**

| 1. A systems perspective: food is situated within the wider context of society and the environment, the past and the present |
| Maintaining the balance between the Yolngu and Balanda food systems |
| Constituents of a healthy diet: balance, variety, fresh food |
| A dietary pattern, not individual foods contributing to illness |

| 2. Conditions of poverty, high food costs, the cost of living and food insecurity |
| Centralisation, overcrowding, poorly equipped houses |
| “Mayaltha” and long-life foods: damper becomes the problem |
| The tensions of sharing: a cultural strength, a social welfare structure, cultural obligation and “humbug” |

| 3. The traditional knowledge system: integral to Yolngu epistemology, a different learning structure |
| Growing up with food, social learning and role modelling |
| Yolngu agency: freedom to choose; freedom to make mistakes |
| Younger people thinking differently |

### 7.4.1. Balancing the Yolngu and Balanda food systems

**Balance between Matha’yal and Murnyang foods to satisfy**

Ngatha is the Yolngu word used to describe food in general. Food is also categorised as: ngatha (plant foods that represent carbohydrate foods), warrakan (meat, flesh foods), maypal (shellfish), and mapu (eggs). Matha-yal’yun foods and murnyang’ foods provide balance in the Yolngu food system. Matha-yal’yun means to seek relief by eating fish or meat after a purely vegetarian diet; and murnyang’ foods are the plant or vegetable foods; the sweet or starchy delicacies.

So these things have to come together, there has to be the balance between matha’yal and murinyang to satisfy Yolngu (Senior woman speaking, 2005).

Turtle, fish, oysters and other flesh foods are generally classified as matha’yal foods and yams, cycad bread, fruits and berries and other plant foods as murnyang foods. Traditionally, according to the seasons, people would eat foods hunted and collected in a particular location, until they “craved” a different type of food (Field notes, 2004). For example, oysters and seafood were collected from the sea area until
vegetable foods were craved. People would then dig for yams and collect fruit (Field notes, 2004). The contemporary equivalent of matha’yal and murnyang is eating turtle or fish for example and then finishing the meal with damper and syrup or tea and sugar (Interviewee 2004).

Achieving balance through the intake of plant and animal foods is an important aspect of nutrition from a Yolngu perspective. The deeper symbolic basis of this dichotomy of plant and animal foods was beyond the scope of this study, however there may exist different interpretations of this. For example, it is interesting that meat, according to a desert Aboriginal man’s perspective, had cooling properties and was an essential part of the diet to cool the blood, brain and heart to ensure proper bodily function.

**Categorising food by place**

The term “bush food”, whilst commonly understood to encompass all traditional foods, is misleading, and was considered by some interviewees to undermine the value of Yolngu foods and to detract from the wide variety of foods naturally available to people (Elder man speaking, Workshop, 2005). Foods were referred to by interviewees according to their natural habitat: that is, foods from the sea, the bush, the mangrove, the rainforest, the fresh water areas and the sea-shore. Reference to “bush foods” thereby, indicates yams, fruits, nuts, wallaby, honey and other foods found specifically in the “bush”. It does not include foods collected from the sea, the mangroves, the fresh water or the rainforest.

Furthermore, when interviewees referred to specific foods, generally the particular food species was indicated in addition to seasonal availability and method of preparation. For example, when referring to yams, interviewees named and provided information pertaining to several yam species. Conveyed within descriptions of foods were representations and messages for the person being told the story and for the younger generation.
The traditional staples: the plant foods

Older people’s narratives particularly focused on the traditional foods. The foods referred to primarily, in the narratives of both men and women, were yams and the cycad nut. Evident from the data and supported by anthropological work of Thomson\textsuperscript{408} and Meehan\textsuperscript{35} is that a bread made from cycad nuts together with the different types of yams were the staple foods for Yolngu at Galiwin’ku and throughout North East Arnhemland. These foods were available for the most part of the year. The following quote demonstrates the dietary significance of these staple foods:

For us the gulaka [collective term for yam] was the main food, those foods I have mentioned were number one ngathu [food] for us, we never grew tired or sick with that….the guluka was the main ngatha, not to mention djitama [cheeky yam; Dioscorea bulbifera], for djitama we collected them, cooked it, scrapped the skin with a mendung [snail shell], then soaked it in a water (Elder woman speaking, 2004).

The cycad bread could be stored over several months and was prepared as a sacred food for ceremonies when food collecting and hunting came to a standstill. This cycad bread continued to be prepared after the mission was established as evident from the following excerpt:

The damper made from the cycad fruit played quite a large part in their diet. It was the basic food used throughout their ceremonies when no-one was going hunting. Well before the event, the women would go out and prepare and cook the fruit and make it into a flour and then damper. This has the capacity to remain good without refrigeration for a number of weeks. I’ve seen stacks of this under shady trees, two metres long, about two thirds of a metre wide and nearly a metre high. Enormous energy is used by the dancers in some of their ceremonies and it was the cycad damper that basically sustained them (Elder man speaking, 2004; missionary from 1948-1967 Elcho Island mission speaking, 2004).

While some Galiwin’ku people, particularly the older women, still dig for yams, the preparation of cycad bread which involves a 5 day process of “gathering, soaking,
cooking, scrapping, leaching, kneading and cooking” (Interviewee 2004) has not occurred for a number of years in Galiwin’ku community, although people in the homelands continue to prepare and consume this food (Personal communication, J. Greatorex 2004). The symbolism attached to the process of preparing cycad bread and to the cycad palm however, guides people in their lives and connects people with their land and ancestry. The cycad plant and cycad nut although not consumed as frequently, continue to have great significance for people, both young and old.

**Variety**

An enormous variety of traditional foods are available throughout the seasons.

…there’s lots [of Yolngu foods] out there that we can collect like fruits of any kind, djalpinyngu [Large, hairy yam; Curculigo ensifolia, Gardenia megasperma], ganguri’ [Yam (collective term), Dioscorea sativa] and so on, there’s just too much out there, riny’tjangu [annual herb with edible tuber; Eriosema chinense Vogel], duynya [climbing plant with perennial tuber; Ipomoea graminea R.Br]….right! (Elder man speaking, 2004).

Traditionally, people achieved variety in food intake over days and through consuming complete animals, in contrast to consuming a variety of food on a daily basis as recommended in the Australian Dietary Guidelines\(^{257}\). Yolngu cuisine also tends not to mix foods in preparation or consumption as is popular in most non-Aboriginal Australian cuisines. The tastes of singular food items are relished. For foods that require cooking, each food is prepared and cooked in a particular way (Field notes, 2004).

**Our system from a long time ago, only eat fresh one: changes happening**

Certain Yolngu foods had the capacity to cause illness which occurred relatively spontaneously. This enabled a built knowledge of the ill effects of specific foodstuffs and the preparation or process required to make the food edible. Harm from consumption of a noxious food could be avoided by understanding and observing the laws governing Yolngu food. Except for a few foods that could be
preserved or stored, such as the cycad bread, nuts, and fruits, Yolngu foods were collected or hunted, processed, and then eaten. The importance of fresh and natural foods was emphasised:

The Yolngu ngatha is 100% free of anything, any chemicals, and we do not get them from factories, we just get them free and fresh, just from the very spot where we collect them (Elder man speaking, 2004).

Indeed prepared take-away foods and manufactured foods were regarded with suspicion. The language used to describe the potential danger of ingesting take-away food was very emotive. A level of distrust particularly regarding other people involved in preparing food for sale to Yolngu was implied. This general distrust identified throughout the community was particularly directed to the privately owned take-away where only non-Aboriginal people were involved in the preparation and serving of food. Whilst many stories were told to me regarding people’s suspicions of the take-away food, and accounts of diarrhoea or food poisoning as a result of ingesting “yatjkurr ngatha” [bad food – food that has not been maintained under hygienic standards], the take-away continued to be a popular food source, particularly for young people (Field notes, 2004). However when purchasing a hot meal, people would purposely ask the take-away employee for a “fresh one” (Take-away employee speaking, 2004). Processed foods were referred to as “keeped foods” or wungu foods [given by someone/made by someone]:

don’t know what’s happening in factory…sweat…might not wash hands…or allergic when eat, see symptoms….eating something not good for them…our system from long time ago, only eat fresh one…changes happening (Elder man speaking, community workshop, 2005).
Some are cooking and some are relying on take-away food because that take-away food by my understanding it is killing us….because some ngatha [food] would be manymak [good] and some ngatha [food] would be bad. The people that works in the take-away will never tell you what food got cooked yesterday………the food from the next day has to go to the bin or rubbish dump, don’t keep it there then cook it next day, warm it and then sell it again, that’s killing Yolngu (Elder man speaking, 2004).

The distrust described here in relation to food is not unique to Yolngu culture. According to Fischler\textsuperscript{409}, relying on variety in food intake has required people to be generally cautious and conservative in their eating. Birch\textsuperscript{410} describes this as a predisposed neophobic reaction to new foods. However a distrust to new or unknown foods can be transformed into a preference through social learning, such as exposure and role-modelling\textsuperscript{410}. A high proportion of the French population for example have been shown to have a general “disgust” for processed foods\textsuperscript{409}. Paradoxically, these same people were shown to be the most frequent users of processed foods\textsuperscript{409}. An ethnographic study among Aboriginal people of Ngukurr community in the NT, also reported people’s concern about food being purposely tampered. In contrast to the present study however, people were more trustful of take-away food and distrustful of food prepared by fellow Aboriginal people due to sorcery concerns\textsuperscript{411}.

**Two food systems: A balance between the Yolngu food system and the Balanda food system**

Chapter 6 demonstrated that throughout the mission era people relied on two food systems, the Yolngu food system of harvesting and management of naturally available foods and the Balanda food system of rationing and gardening. People interviewed also differentiated between two food systems, the Yolngu and Balanda food systems, and indicated both the positive and negative possibilities that this presents for Yolngu people and the complexity involved in interacting with two food systems:
So there were two different kinds of food at the same time, it was like a balanced diet kind of foods, one from Yolngu side and the other from balanda side, that’s how we lived on (Elder woman speaking, 2004).

..they were afraid of the whitefellas, afraid of what to eat…when they first tasted it, it was like they were only testing it, what kind of food the whitefellas ate, but some felt that that food did suit them, from then on the people ate two different kinds of food, it was food that the whitefellas introduced and also our natural bush foods, they still wanted to go on eating the bush foods…yes, yes…just to be sure, that the bush foods are always here for us (Elder man speaking, 2004).

As discussed in Chapter 6, it was the balance of these two food systems that contributed to people’s general well-being throughout the mission era, when food available through the “Balanda” system was limited and variable and was complemented by the then abundant and secure procurement of “Yolngu” foods. In addition to providing nutritional sustenance, Yolngu foods more importantly reconfirmed people’s identity in a fast encroaching non-Aboriginal environment and allowed people to experience the freedom of their culture that the mission structure inhibited.

**A change in the balance: more money, more store food, less Yolngu food, less physical activity**

This balance between Yolngu and Balanda food was perceived to change in the late 1970s/early 1980s. This was said to coincide with a new trade store being built, a consequent greater variety of Balanda foods available for sale (albeit relatively restricted), more disposable income in the community and the introduction of take-away food. With wider access to money through government benefits and a greater variety of store food, the necessity to gather Yolngu food to ensure an adequate food intake diminished.

It changed quite a lot over the time we were there [1973-1981]. When we first went there [to Elcho island mission] it was pathetic really. You basically had one barge from Brisbane every 6 weeks and that would bring mostly canned stuff and dried
stuff and flour, sugar and tobacco. We the Europeans, we made personal orders, potatoes and things like that, not very fresh produce, but that would come in every 6 weeks, the store would often be empty and it was really hard just to find things to eat (Ex-missionary male speaking, 2005).

That [the store] was a mission enterprise…but gradually as more money came in and more barges started to come from Darwin way and produce would be flown in and the store would have a bigger range of stuff. I suppose by the time we left there was quite a much better range that you could buy from the store…we still used to occasionally make a private order, and they would send it on the barge…mainly tinned stuff (Ex-missionary male speaking, 2005).

**From rations, to plenty, to sickness**

Years of living within a disciplinarian regime suddenly gave way to a “laissez-faire” political order in the shape of the freedoms of self-determination with few external controls\(^{169}\). Like any other society, the traditional Yolngu social order depended on a mixture of external and internal constraints\(^{169}\). With self-determination, the structures and controls established during the mission era that related to every aspect of life including eating were no longer in place. The structures relating to the Yolngu food system that the older people were familiar with, were unable to fill the vacuum\(^{169}\).

Older interviewees referred to the disintegration of controls and structures as contributing to current food behaviour and wider social concerns. During the mission era, both Yolngu and mission structures controlled food intake. The mission superintendent guided by government policy, controlled who received rations and how much. Similarly, traditional Yolngu structures firmly in place during the mission era determined food distribution within the family unit. Ideals established during childhood about food quantity, were particularly salient for older people interviewed. During the mission era, the amount of food rationed was restricted and controlled, so that once people received their ration they could never ask for more.
...during that time we had rations of flour, syrup, rice, and so on, we received rations,....no it wasn’t a very big food/tucker...it was only given to us in little cups...When Bapa arrived he bought food for us, but in small amounts, that is where it all started (Elder woman speaking, 2004).

The past situation of restricted store food and token wages was contrasted with the present situation of a relative over-supply and ready availability of these same foods:

And we didn’t have a lot to eat [store foods], like we do nowadays, we eat damper/flour all the time, or go to the take aways regularly (Elder woman speaking, 2004).

This difference in availability was considered by older people in particular, as contributing to current levels of sickness. Rationing of food during the mission era was considered to be a deliberate action by the missionaries to curtail dependency and associated sickness, it was not perceived as an action of financial necessity or social control. Many people in the community, both young and old recalled the warning told by “Bapa Sheppy” that “you’re going to get sick if I give you lots of food”:

this is what he told, God knew him, he spoke through him to tell the people, that they would only get a little bit of everything. Then later on or in the near future there would be lots of Balanda and lots of rubbish. It was for real that he said this would happen, and there’s lot of sickness around now. He would give us enough, just a handful of everything and that was it. What was given we ate, and went, and we didn’t come back to get more. We went away and collected wild honey and all those bush foods. Maybe we have forgotten all the bush potatoes, yams, and so on....we only had a little bit, and little bit for each day (Elder woman speaking, 2004).

An increase in people’s body size observed over the last two decades was related to a more sedentary lifestyle associated with an increased reliance on store and take-away food:

Today for all of us our body shape has changed. This is because we are eating a lot of the wrong food.....You know people today, both woman and man, because we
eating, that’s why we’re growing wrong shape. You know it was alright in the early
days. All the people, men and woman, were all fit people you know (Elder man
speaking, 2004).

……..there were always some big people, heavy people, overweight people,
but so many of the people had really great physiques, the men were well built,
the women were slim slight and athletic, lots of people played football and
basket ball, women and men, playing basket ball and extremely athletic. A
lot of people did a lot of walking…when I first went there, I think there was
one private vehicle, one private car, no Aborigines had any private cars, that
was in the early 70s. There were a few mission vehicles that were used
basically for work, but if you wanted to go hunting you had to walk (Ex-
missionary speaking, 2005).

An imbalance in the food system: not individual foods

The imbalance between the Yolngu and Balanda food system was associated with a
sense of loss of capacity to guide and nurture young people to make wise choices.
Older people were concerned that people, particularly young people, were
increasingly relying on the store and the take-away and “forgetting about” or “losing
the taste” for Yolngu food.

We are lacking, we are not educating our people, children, new generation, for
hunting, teaching them, for finding the right season, which is the good season for
something…that is why the new generation coming up….know shop food, not bush
food….these children will end up with sickness (Elder man speaking, 2005).

Imbalance was articulated in different ways: An imbalance was considered to exist
where there was too much reliance on take-away foods; where there was too much
reliance on store food rather than Yolngu foods; and where variety, which in the past
included fruit and vegetables and a balance between animal and plant foods, had
given way to a reliance on damper and sugar.
Balanda food presented contradictions. Flour and sugar, the two main foods rationed in the past, which the older people in the community grew up on together with their parents, were not previously “demonised” by health practitioners. They were in fact prescribed by government officials and distributed by the very hands of “Bapa Sheppie”, the mission superintendent whom people trusted:

We didn’t learn about the consequences of eating food. We weren’t told that if you take a lot of sugar it’s going to kill you. They never said it like that. Nobody knew that. The people in those days were thinking that they were coming from there, that everything was good. You know, like it doesn’t matter if they eat this and that……nobody knew (Elder man speaking, 2004).

There was no indication in the past, that these foods (sugar and fat in particular) would be associated with chronic disease in the future. People stressed that different to the past, people are dying today in their 30s or in their 40s and that a reliance on store food in connection with other factors is contributing to this.

The present dietary pattern, rather than individual foods per se, was associated with ill-health. For example, damper as a food itself was not directly associated with sickness but was considered to “become the problem” when relied on as the main food. Similarly, the amount of sugar rationed in the past, although similar to the amount of sugar on average consumed per capita presently, was not considered to be a problem in the past.

The difference between the past and the present in relation to food was understood in relation to a trend towards sedentarism. People in the past were described as being “working people” and that “people worked by hand, not by machine”. Furthermore, sugar was perceived to be a contemporary problem because of the availability of many more sugar containing foods, such as carbonated sweet drinks, confectionery, biscuits and cakes (referred to as “the newcomers”) in addition to sugar per se. Oil and certain take-away foods were referred to as problem foods and contributing to sickness, but in relation to the quantity consumed:
They are using a lot of oil and stuff to cook ngatha [food], but stuff like…. when they cook it with salad, it is manymak [good], or beef. Like for example, beef and rice, because like me, I only get beef and rice from the take away, any other cooked food, I can’t eat (Elder man speaking, 2004).

**Freedom of choice: Yolngu food alleviating food insecurity**

Yolngu food was considered to protect people from food insecurity when there was no money available to purchase food. This was particularly expressed by families who accessed their homelands frequently or by families where “homelands people” (people who resided on their homelands for a large part of the year) were temporarily resident in the household. Homelands people generally expressed concern for people living in town as they were perceived to “go without” (Field notes, 2005). Town-based families with a resident “hunter” (that is a person highly motivated to go hunting regularly and very skilled) also benefited from access to Yolngu foods (Field notes, 2005):

Nowadays we are stuck on eating Balanda ngatha [food] most of the time; like drinks, tinned foods, breads, almost everything, lollies and so on, fatty foods. Mostly we spend our money on these things…but the bush foods we have out there are for free. And for the food in the shop, we count how much it costs, pay for it then cook and eat. But for the bush foods, we just go and collect them free, and eat free of charge, just free (Elder man speaking, 2004).

Fish, maypal [shellfish], ganguri [yam], especially [on the] weekend, we go and get bush food, seafood mala [different types of seafood], we go and get maypal [shellfish], fish, mangrove worms, we bring them back…. And pay-week we go to the shop, mainly the shop, not the take-away…and off pay-week and week-ends [then] hunting for sea food (Young woman speaking, 2005).

Hunted food is not as easily accessed as it was during the mission era and although considered to be “free” by interviewees, there are definite costs in terms of money, time, labour and perceived security. The settlement of many different language groups at Galiwin’ku has amplified fear, suspicion and distrust generated over
generations of between family rivals and arising from a deep seated Yolngu belief in sorcery. “Galka” are the most feared of sorcerers. They are real human beings, mostly men, who have acquired the power and training to kill by stealth. The belief that over two hundred people resident in Galiwin’ku are galka (Field notes, 2005) illustrates the magnitude and level of distrust among people in the community. This fear inhibits some people from feeling free to walk any distance from the community and to thereby go hunting or to walk freely around the community (Field notes, 2004) or for some older people to even visit the store (Personal communication, J. Greatorex 2004).

Furthermore, the natural environment is not able to sustain such a dense population and people are having to venture further from the community to gather Yolngu foods. Only some families have access to a motor vehicle or a boat and for these families money is required to buy fuel, for car maintenance and repairs, and for car loan repayments. The cost of fuel is twice that of Darwin. A further cost involved is that gun licences and licence requirements such as a lockable gun safe are prohibitive for most people or too difficult to obtain as the process is difficult for people to independently engage in.

7.4.2. Poverty, cost of living, and food insecurity

Food insecurity

Throughout the period of fieldwork, references were made to there being “no food people”. For reasons not explored in this thesis, these people were perceived as having “nobody helping them” or having no-one in the family “working for them”. These people were considered to “have no choice” regarding what food they ate and therefore had no option but to “eat anything” (Field notes, 2004). Sole female parent families were considered by one interviewee to be vulnerable to food insecurity (Field notes, 2004) as were children (Field notes, 2004). With an increasing number of deaths among relatively young adults, young families are having to cope with the loss of principal carers. A relative class distinction also became more apparent over the time I spent in the community where there were clearly the “haves” and the “have
nots”. This heterogeneity among people in the community and between households was often referred to by interviewees. Interviewees also implied that there were families who for generations had struggled and were more vulnerable to food insecurity:

Some family’s are like that…are living like that..have been living like that all their life….unless the parents will have to be really strong (Elder man speaking, 2004).

Mayaltha week – Monday and Pension week: no money, no food

Mayaltha is the time of the wet season when food is limited. Mayaltha week is the term used by Yolngu to describe the off-pay week, the second week of the fortnightly pay cycle. It is described as the damper week or “nothing week” when there is no money and where relatives are relied on to assist family members with food or money. Pay week is not the same week for everyone, resulting in a constant trickle of money being distributed among people except for week-ends and Mondays (Table 7.3).

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<th>Table 7.3. Fortnightly payment schedule as of 2004, Galiwin’ku community</th>
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<td><strong>Week day</strong></td>
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Table 7.3 shows that the money circulating in the community in one week is mainly received from government social security benefits, whereas money available during the following week is mostly received from paid employment, largely through CDEP. People employed through the Marthakal Homelands Resource centre receive
their wages on the Monday of the first week of the fortnightly pay cycle. However a large proportion of this money is not available to the Galiwin’ku “town people”. Mondays and “the pension week” (week 1 – social security week) were described as the times when people were “starving” as there was “no money and no food”:

Monday problem, first Monday of the week, too many rrupia [money] going to kava, cards, marijuana-lil [for marijuana], then when comes to Wednesday they do big shopping….Some people hungry on Monday (Workplace focus group, 2005).

Dharrwa [lots of] Yolngu are now finding hard with ngatha [food] rrupia [money], and living, 2 weeks, then another week no money (Family focus group, 2005).

Financial management

Wages and government social security benefits are mostly paid into people’s personal bank accounts. There is a Traditional Credit Union (TCU) banking facility in Galiwin’ku and people are able to withdraw money from their accounts, pay bills and make other financial transactions. An ATM facility at the store allows people to withdraw cash from their bank accounts with normal bank charges applying. Cash can also be withdrawn through the take-away EFTPOS facility for a fee of $5 per transaction or for larger transactions, $5 per $100 withdrawn. An increasing number of people are accessing internet banking facilities to manage their finances.

Interviewees in salaried positions more so than people in the wider community commented on the inability of people to budget their money. While this implies that community members in salaried positions are able to better manage their finances, on the other hand these people often had less disposable income, as payments for cars or other credited goods were automatically deducted from their fortnightly pay. Whether or not these people were expected to share a greater part of their income with their relatives than those not in paid employment, was not explored. However, some interviewees commented on the “humbug” and the “phones ringing hot” on pay days. Despite earning a higher income than the majority of people in the community, these people also relied on family for food at times when they had no money:
You know what family are like, when someone gets paid, they don’t want ngatha [food], they don’t want anything, they want cash. Some people got motor car, sometimes got boat….costing on motor car, it costs petrol, diesel and than none left for ngatha [food], everything else is costing rrupia [money] (Elder woman, 2005).

The ability to manage finances was dependent on demands for money from other family members. In family units where there was kava drinking or marijuana use, the demands placed on family members for money or food were considered unreasonable and placed enormous economic stressors on the family. In a case study conducted among 28 households in Kuranda an Aboriginal community in Northern Queensland in relation to welfare and child care, alcohol and drugs were perceived by parents as major issues. Illicit drugs sold in remote communities fetch inflated prices on the black-market. In 2005, a half gram of marijuana cost $55 in the community compared to $10 in Darwin (Field notes, 2006). Excessive gambling (card playing) was also considered to place excessive stress on the family unit. However it also viewed as a means to quickly accumulate cash:

Other Yolngu try to make rrupia [money] up in the card if they get $200 or something and get fridge, the only way they can, is play card to make up their rrupia to buy dharrwa [lots of] ngatha [food]…they are not there to waste money they are there to get something…..I know there are a lot of people playing cards and they get the rrupia [money] and run to the shop (Elder woman speaking, 2005).

Besides gambling and kava, other valued commodities such as mobile phones and air travel to visit and communicate with family also compete with food money. An airplane charter to the nearest town, costs $1200 return. With recently available mobile communications access, mobile recharge credit comprises 5-10% of total store sales (Personal communication, ALPA Nutrition manager, 2006).

Only money left for damper

The price of food and other goods was considered a major factor influencing nutrition and a problem that needed to be seriously considered by the community.
Stories were conveyed to me to emphasise the cost differential between foods available for sale in the community compared to Darwin. People remarked how few shopping bags were filled with spending $100 at the community store compared to spending $100 in a Darwin supermarket:

Very hard for me to get these foods – because I don’t have money, I only have small rrupia [money]. These are big money in the shop. I only have these [referring to fruit and vegetables] in Darwin or Gove….here, $100 or $200 little bit of food. And that is why people only buy flour (Family group discussion, 2005).

That is the other thing the community needs to look [at], the whole community here, we are worried about the stuff that we buy, ngatha [food] manymak [good] from the shop, and yindi [big] price….or even at the take-aways, that is the other thing that the community needs to look at, that is a yindi [big] issue in this community….I’ve been asked a lot of time by Yolngu, “how the price going up at the shop or take-away?” (Elder man speaking, 2005).

…because the price is going up [store prices] every year. There is good food there but price gone up, some people they are living on little rrupia [money]. That’s the other problem, so they need to drop the price down a bit……The only way if we want to buy ngatha [food] from the shop they could make ngatha [food] cheaper so that everyone can buy ngatha [food] (Elder man speaking, 2005).

Basic household items, considered by the average Australian as household necessities, such as a television, video player, mattress, refrigerator or washing machine, were generally perceived by people interviewed as not affordable. To illustrate the cost of these products for community members, in 2006 a non-stick electric frying pan purchased through the community store cost $127 compared to approximately $70.00 for a similar product purchased through a Darwin based retailer. Household furnishings are generally not available for purchase on the island. Lounge chairs, tables, beds and other household furnishings, if desired, must be purchased through a Darwin retailer and then barged to the island at $183.45 per cubic metre for freight.
The majority of households at Galiwin’ku do not have basic furnishings. Exploring whether this is due to affordability, personal preference or cultural reasons was beyond the scope of this thesis, however the cost of basic household items relative to people’s incomes, suggests that cost alone would significantly impact on a decision to purchase even basic household items. In 2004, 69% of households were reported to possess a functioning refrigerator. The cost of whitegoods is exponentially increased by wear and tear. With households averaging 10.5 residents (estimated from 2001/2002 community-wide screening) and having a high proportion of children and frequently visiting kin, the wear and tear on white goods is high. Refrigerator repair services on the island are often non-existent. Once a purchase for a larger item such as a refrigerator or a television is made there is little money left, “only money for damper” and so “damper becomes the problem”.

You can buy for example electric frying pan the price is too high. Or normal frying pan or cups. I bought 4 cups from there [store] and one cup cost me $8, for one cup, for drinking tea, $8 for one cup. From the workshop BP [council owned shop attached to service station], I can buy cup for $5, what is the difference there? And in Darwin you can buy a cup for $2 or $1 even…..I don’t buy here, I can’t afford here….Refrigerator even fridge, we can’t afford to buy fridge from here…..(Interviewee 2005).

**Damper becomes the problem**

Similar to the role of cycad bread and yams in the past, flour, sugar, bread and tinned milk were described as the “long life foods” and were considered by all interviewees to be the main foods, the contemporary staple foods. Flour, bread, sugar and tinned milk contributed around 50% to the total energy available through the community food outlets (Chapter 4). These foods were considered “long life” foods as they were perceived to satisfy hunger for a long period of time and prevent hunger, they could be stored without refrigeration, and most importantly they sustained people during the off-pay week. During pay week these foods were supplemented with other foods such as meat, fruit, vegetables, biscuits, fresh meat, and noodles (Field notes, 2004).
Long life…if we eat damper, bukmak Yolngu [lots of people], eat bread, light one, fills up for longer, stays longer till next day (Family group discussion, 2005).

Some families it’s hard because no ngatha, sometimes bitjana [like this] no ngatha [food] and then come to pay week, little bit ngatha [food] damper, sugar, and then coming to pay day week, more ngatha [food] (Elder woman speaking, 2005).

Bread with tea…long life until reach pay week...sometimes get celery and corn, sometimes people think vegetables won’t last (Young man speaking, 2005).

Only one of the people interviewed did not indicate food insecurity within his household. This man was in a salaried position as were other members of his household. In contrast to other people interviewed, this man implied that the means were available to people to make healthy food choices, in that everyone received money and had a kitchen, but that many people instead were spending their money unwisely on “kava and ganja [marijuana]”. Whilst his family did buy fruit and vegetables and cooked with these, he stated that some other families weren’t buying these foods for two possible reasons. Firstly, incorporating introduced fruit and vegetables into the diet had not become a social norm and secondly, mixing plant and animal foods in one dish was not a Yolngu practice:

Maybe they don’t know or maybe for some of them, their parents never had all those fruit and vegetables. There is a lot of salad and other things like apples and oranges in the shop, but nobody is buying it. Some of us, our parents know about fruit and vegetables, this knowledge comes from generation to generation. We still buy the cabbage, lettuce and other things. For many people, they don’t want to cook meat with something. They want to have the meat straight away, nobody wants to cook it with other things. That is how we learn it from our parents (Elder man speaking, 2004).

While some families do have adequate facilities for home food preparation, in 2004 only half (51%) of community households had a functioning oven/stove and less than half had vermin proof storage facilities\textsuperscript{414}. 

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Fruit and vegetables mala [group] are missing

One interviewee provided the insight that because of food insecurity “damper becomes the problem” and that “fruit and vegetables are missing” from the average dietary intake of people at Galiwin’ku. People interviewed inferred that if fruit and vegetables were purchased, it would most likely be during pay week. Everyone interviewed demonstrated that they liked fruit, and certain vegetables such as sweet potato, cassava, pumpkin and capsicum. On a restricted budget however, vegetable and fruit purchases were considered too risky as waste was likely due to improper household storage facilities and as they were considered too expensive a commodity to share.

Managing food in context to others was very salient for people interviewed. One young man commented that Yolngu are not vegetarian, and that if he was to buy meat and vegetables to cook, and family came and took the meat, he would be left with vegetables and would have nothing to cook with them to make them tasty. The following excerpt from field notes relates to a conversation I had with an Aboriginal colleague who has type 2 diabetes. She was feeling unwell and was concerned that her blood sugar levels had been consistently high. Together we reviewed her diet:

Breakfast - 3 weet bix and tinned milk and tea and milk (she’s trying not to have sugar). Mid morning she feels hungry for bread and tea, so has about 2 or 3 pieces of bread plain with tea. Afternoon she has bullocky [meat] boiled with noodles and rice. And cup of tea before going to bed (Field notes, 2005).

On highlighting that fruit and vegetables were missing from her diet, her response demonstrated that buying a bag of apples for example and keeping them to last the week is for most people not a realistic option:

the children eat these if she buys them, and the only solution is to buy a small refrigerator and keep it in her room and lock it up. She keeps her insulin in the fridge and the kids don’t touch it. She bought some fruits on the week-end and they were all eaten straight away (Field notes, 2005).
The wider impact of food insecurity

The ramification of food insecurity extends into every aspect of a person’s life and the life of the community. Food and money are central to people’s daily discourse and much time is spent securing food, that is asking for food, getting food and demanding food (Field notes, 2004). School life for children is disrupted as children purposely miss school on pay days to guarantee their share of money and food (Field notes, 2005).

Sharing and “humbug”

Generalised reciprocity or demand-sharing as other researchers have referred to it, is an important and intrinsic feature of Aboriginal Australian social life. It is the cultural mechanism by which cash, resources, and other forms of practical assistance are exchanged and redistributed within and across households. Demand-sharing requires a person respond to the demands of another for something which is in their possession. From the perspective of demand sharing, the act of sharing is more explicit. Moral obligation and commitment to others is construed not in terms of giving and then expecting something in return, as in Western culture, but in terms of responding positively to demands. Demand-sharing of food serves as an index of the state of social relations. I observed food demanded, food shared generously, and on many occasions food purposely retained to share with a family member/s absent from the food occasion.

While most interviewees indicated food insecurity in association with the on-pay/off-pay week cycle, it was a given that people had the right to seek food and other effects from family members through the Yolngu law of sharing. When food was not available in one household, people freely sought food from another related household. As observed among the Yuendemu community, people move between households in an attempt to maintain economic viability.
Choose when rrupia [money], when no rrupia [money] we go ask family for damper or tea, if nothing then we go to another family…..if they have little bit they give it to us (Family focus group, 2005).

People come and cook it, no wait to ask, they just come and take it away, no help, and whenever Yolngu people makes what ngatha [food] they make, we are just fitting in, just expecting what is there, that is our Yolngu rom [law/way of life], what they buy, they eat (Elder woman speaking, 2005).

Both the negative and positive dimensions of the act of sharing were referred to by interviewees in relation to food insecurity. Sharing was considered by interviewees as integral to Yolngu life and as an act to acknowledge, reaffirm and reinforce relationships with kin and to show a dependency on kin:

We know what to get, but it’s not only for us, we must and always take some back to give to our family’s and other family members; and by doing that we are helping them to stay strong and live a healthy strong lives. And we have this very strong custom in helping each others, foods and everything, and we still live by that law….how?....when I run out of food here, especially the food that I buy at the shop, I sometimes or just often times, I go around to my brothers place or my sister-in-laws or my brother’s family, especially my other family members. I go there to get ngatha [food] from them….yes….but for me, when I come back bringing back something with me, I not only share it with my immediate family’s but also to other extended family, not only what I collect but also what I buy from the shop…..(Elder woman speaking, 2004).

While the act of sharing helps to bestow goodwill and strength on the recipient, a group of interviewees demonstrated how the act of sharing had the power of healing through showing love, care and demonstrating belonging and connectedness:

Saw sick one, Yolngu, his father at Matamata he was very sick, he was healed and then ceremony come for short time to make him feel manymak [good], so he is good again, he was nearly going to die and the family came, not only ngatha [food], or murrina, sharing of love, comforting, spiritual and that makes the healing come through (Elder woman speaking, 2004).
The ramifications of not sharing can also be powerful and was perceived by interviewees to bestow ill health on the person considered to be selfish. Gecas and Burke\(^{415}\) commented that the act of not sharing could risk isolating the individual from the network of reciprocal relationships. When I asked a group of interviewees what would happen if they refused to share, they at first looked at me with a blank stare and then one jokingly said, “they’ll be cursed” (Workplace focus group, 2005):

Even if I have ngumikuniny [small] ngatha [food] I can give it away, inside the story of sharing…if I see that Yolngu again, I don’t feel good….ashamed if people don’t share (Elder woman speaking, 2005).

3 people in a canoe……the one that throws the harpoon or spear, the one that cares for the canoe and the captain, they are all entitled to special parts of the turtle. Wawa, he was not sharing miyapunu [turtle], he would keep the parts in his freezer and only him and his family would eat it, because he reckons it is his boat, he hunted the canoe. If other people came past he did not say, “come I have some miyapunu [turtle] for you” and that is why he got sick. [Another man] too, he was only sharing with only his family and [interviewee] would say to him, “you have to share with others in your extended family”, because he has heart problem and that is what he started doing and now he is good (Elder woman speaking, 2005).

People are socialised into the “art” of demand sharing and learn strategies to non-offensively and respectfully refuse or avoid the demander’s request\(^{416}\). The availability and use of illicit substances however has distorted reciprocation and resulted in some people or households being particularly vulnerable to food insecurity. Requests for food or money considered unreasonable and not required under obligation, sometimes resulted in a dispute, or parents being held to ransom by a young person threatening to self harm (Field notes, 2004).

Lots of Yolngu have nothing, so damper becomes a problem…get tired of that, but have no choice because Yolngu don’t help each other this time because alcohol, kava, ganja, taking away that rrupia (Interviewee 2005).

CDEP rrupia [money] is only a little bit of rrupia [money] – won’t take us long to go over. Pensioner, unemployment, child [family payment], CDEP only little bit, chuck
in money and buy food...no money, unemployment rrupia [money] not to cover everyone, because all the problem, marijuana, kava, card, that is where all the money goes. We try to make up rrupia [money] and buy food, but then cards, kava. Hard to save up money as gurrutu [relation/kin] around everywhere to ask for rrupia [money] (Family focus group, 2005).

Household systems to manage the tensions of sharing in a contemporary society characterised by over-crowding and centralisation of different family groups were observed. For example, those people who owned a refrigerator were more likely to keep the refrigerator in a locked bedroom rather than in the open living area of the house, as the placing of a refrigerator in a common room allowed people to freely help themselves to the contents of the refrigerator:

Yolngu put fridge in the middle lounge room, when you are sleeping they will take it. Now wrong way, we keep the fridge in the room, in that way we can keep our ngathaa [food] safe. Yolngu thinking free choice and just go and take things without asking. I will not go to people’s houses and ask for ngathaa [food]. I will only go to family that I know and we give each other ngathaa [food]....I will not go to other people’s homes, I feel ashamed, I don’t feel comfortable... (Elder woman speaking, 2005).

As with food, cups, bowls, knives and eating utensils are also shared between family units and households. There is no compulsion to return something that has been taken from another person’s house and indeed asking for the particular item to be returned is considered offensive. In Yolngu society, where social capital is more highly valued than accumulation of material goods[^169], material items such as kitchen utensils do not belong to anyone specifically and are therefore the responsibility of no one person (Field notes, 2005). In some households I observed, there was the absolute minimum required for food preparation such as a billy can and a spoon, whereas other households had managed to retain basic cooking utensils and kitchen goods:

Sometimes they disappear [referring to items purchased such as cups and food etc]. When people walk in they grab it and go. We never know...they say we’ll borrow it
and bring it back, but they take that pannikin [cup or bowl or cooking vessel], leave it there and forget (Elder woman speaking, 2005).

The same problem that everyone talks about…if the owner of the house buys knife, fork, pannikin, the other person borrows it and takes it away and never returns or throws it, and that’s how the pannikin [cup/bowl] is gone….because it is a problem when Yolngu are living together in one place…I rely on you for everything and you are the house owner and I say to you and expect you to buy food and expect you to buy pannikin, rent, you get tired of that…..(Elder woman speaking, 2005).

**Take away food: a quick, convenient option, or a necessity**

Interviewees held different views regarding a perceived increasing reliance on take-away or convenience food particularly observed among young people. For some people, take-away food presented a quick, convenient option when the person was hungry or did not “feel” like cooking or cleaning. However frequent users of the take-away were considered by some interviewees as lazy. Lazy in this context has multiple meanings which were not explored.

Other interviewees stated that take-away food had become a habit for some people (especially young people) and “they were addicted to it and couldn’t let it go, and therefore needed someone to not force them but to remind them and encourage them to consider other foods”. Interviewees also inferred that for some people the take-away had replaced the communal kitchen operating through the 1960s for reasons that were perceived beyond people’s control, such as having no functioning cooking facility in the house, problems with vermin, or a problem of too many family living together and therefore family members not co-operating to share money or to cook and clean, and leaving the responsibility to the person who is considered the house owner.

House problem….sometimes the owner of the houses find it too hard to clean up, because we say “manymak [good], next time you’re cleaning up”…but that could be dhung dhung [ignorant/stupid] Yolngu, lazy, not worried about cleaning up house, and they say, “manymak” [good], then nothing…bidi [finished / Ah well]. That’s
what Yolngu people in that one box, in house, not helping, nothing cleaning up…..and they don’t think about the owner, rent muka [OK] ga marriji [and go], and she’s responsible for the house and everytime when the Yolngu he goes into the house…”nha? Nhe dhuwal bungawa, nha dhuwal? [what you think you are the boss] and then starts smashing [gets angry] (Elder woman speaking, 2005).

7.4.3. Knowledge and learning

Knowing the food system you grow up with

Interviewees perceived making Balanda food choices a complex process compared to the perceived ease to choosing Yolngu food. However on removing learned and taken-for-granted wisdom, parallels can be drawn between the two food systems. Yolngu food was hunted and gathered according to the seasons. To a non-Aboriginal person this presents as a very complex knowledge system. The right season for a particular food is determined according to the winds, the tides, the lunar cycle, star formations, the flowering of particular plant species and other signs provided by the environment and learnt by Yolngu over the generations through stories, songs, dances and experience (Elder woman speaking, 2004).

Once the Yolngu food is obtained caution needs to be exercised regarding the correct preparation to ensure food safety and to abide by Yolngu law. For example the cyanide contained within the cycad nut needs to be leached for the correct number of days in a running fresh water stream; the gall bladder needs to be carefully removed from the liver of the fish and stingray; the kurrajong seed pod needs to be carefully cooked in the ashes being careful not to allow any of the offending yellow powder to be blown into people’s eyes; and the djitama [hairy yam] needs to be scraped (grated) and soaked for 2 days to remove a toxin contained within the root (Elder woman speaking, 2004).

Likewise with making a wise balanda food choice, interviewees referred to the need to be able to read and understand food labels, packaging dates and use by dates; to be able to select a meat that looks tender and fresh; to buy variety when shopping; and
to have an understanding of what ingredients comprise manufactured foods as well as the nutrients in food.

If we buy products from the shop we must first read what’s written on it. There can be too much sugar in it, they all mix it up, and all of them have dates written on them, if we buy a product from a shop, and then notice that the date is/ was expired we should not take it. When we go to the shop we must buy fruits and vegies, and if we want to buy a meat, look for the ones that are still fresh and tender. If it comes off from the barge and to the freezers here, buy it straight away before it gets rotten, don’t save it for 1 or 2 months…right.

And the balanda ngatha they say; “there’s too much sugar in this one”; “this is healthy food”, “this food will make you grow big and fat”; this have plenty of iron”….they talk about energy, protein, saturated fat, sugars, carbohydrates, sodium and potassium (Interviewee 2004).

Knowing to prevent adversity

Both balanda and Yolngu foods were perceived as having the potential to cause sickness, an adverse event, or death. However through having an in depth understanding of the Yolngu food system, adversity could be avoided through taking preventive action and knowing and complying with the Yolngu law:

He used to tell us the right time to go out spear fishing or even when we are doing like hunting for weti [wallaby] they could be some bad things there as well that can kill you and he used to tell us what sign you need to listen or see (Elder man speaking, 2005).

Interviewees did not seem as confident in their understanding of the Balanda food system or in a position of control to feel that potential adversity could be avoided, as food consumed was nearly always handled and prepared by others. Interviewees referred to growing up with Yolngu food, living with Yolngu food, caring about Yolngu food and Yolngu food always being there for them. Conversely, the Balanda
food system was considered foreign and not understood. People had the expectation
though that Balanda understood their food system as they had grown up with it:

Yolngu foods, we go by season, what ngathä is good for that season. Like ngathä
from the shopdja we don’t go by season, we only walk in and buy what things we
want. We get them, but sometimes we don’t know, for picking up meat, or chicken.
We don’t know which date that chicken got killed and supplied to the shop, we don’t
look at the month, which month….Yow [yes], some Balanda they are clever, they
walk in and get ngathä [food] and they look at the dates, buy…. Yolngu, sometimes
we don’t …..never grew up on that system….we just walk in, we get them, what we
want, and then go buyem [buy it] (Elder man speaking, 2005).

Learning within the traditional Yolngu food system

The existence of two food systems whilst providing a sense of freedom and choice,
presented a dilemma and upmost concern for interviewees. The structure through
which children traditionally learnt about Yolngu foods was perceived as having
radically altered and whilst interviewees perceived parents and kin to be responsible
for teaching their children about both Yolngu and Balanda foods, a degree of
powerlessness in not being able to adequately fulfil this responsibility was expressed.
There was blaming of both parents and young people. Parents were accused by
interviewees of nonchalance in their perceived inherited responsibility to teach their
children about Yolngu foods, and children or young people were accused of being
disrespectful, undisciplined and not interested in listening to older people in order to
learn. Young people not listening to their elders and parents was also considered to
be a problem among parents in the Northern Queensland Kuranda community in
respect to Indigenous welfare issues³⁹³.

Traditionally, children learned about food and the Yolngu law governing food
behaviour, through everyday hunting with their parents and family, through
observing, listening to stories, and participating in ceremonies where knowledge
about food was transferred through stories, songs and dances. Adults were referred
to as the role models and that through modelling, children learnt to eat the foods that
their parents ate. Knowledge was continually passed on to children, about the
seasons, how to collect and hunt foods, how to prepare foods, and how to ensure “that the foods would always be there for them”. Children were always kept under the watchful eye of their parents until they could recognise the foods themselves:

…our mothers had us in their bellies, they bore us, they grew us until we grew up… and they taught us for all the bush foods like ganguri [yam], duynga [Tuber; Ipomoea graminea R.Br], riny’tjangu [Tuber; Eriosema chinense Vogel] ………… and so on, we ate as we went along watching them and learning from them, they gathered what was in the bush and what was in the rainforests, they taught us. We didn’t eat on our own but what they pounded and chewed was then given to us, then we would eat, that was when we were still toddlers up till when we started learning how to walk, then we were trained to eat on our own and to see the bush foods on our own, whatever our mothers would have collected for the day. We learned from them as we watched them (Elder woman speaking, 2004).

A different learning structure

Interviewees highlighted that the classroom where learning takes place has changed from one where parents were integral to children’s learning in a natural setting, to one where learning is demarcated and separated from parents and the environment. In response to this, whilst trying to make sense of the current situation, interviewees were also seeking solutions to ensure ongoing learning for children in relation to the Yolngu food system and parents participation in this. Children are confronted with choices that didn’t exist traditionally, and may choose not to accompany their parents on a hunting trip, thus missing the opportunity for learning about Yolngu foods and rom [law/way of life]. Furthermore, an increasing reliance on convenience food (take-away food) and store food, in association with the diminished importance of Yolngu food for nutritional sustenance, has limited the opportunities for children to learn about the Yolngu food system through their kin. These opportunities need to be created if Yolngu consider this to be important. On the other hand, parents may not have the means to go hunting, such as having access to a vehicle, or may be involved in employment, or other community activities. Gambling, drinking kava and the easy access to ganja [marijuana] were often associated by interviewees with a lack of motivation of some parents to participate in activities with their children.
The position of parents or older people as credible knowledge sources regarding Balanda foods was perceived to be undermined by other sources of information that young people were exposed to. The example given by one interviewee was a parent advising their child not to drink coca cola as “it’s not good for you”, when counter positive messages about coke were constantly received through the media.

They reckons I am only telling them lie story. I always talk to my kids, have gapu [water] all the time, it is good for your body….Even we tell them because it is already advertised on TV [television] that coke is good or even sprite or fanta or solo stuff like that, it is already there, they’re already watching it on TV, that is why they go in and buy stuff like that (Elder man speaking, 2005).

The appeal to young people and the easy availability of so many different foods that are perceived to be “tasty”, “sweet” and “convenient”, and the granted autonomy of children, challenge parents’ capacity to guide their children’s intake, similarly to parents in wider society. In Galiwin’ku community children are constantly exposed to foods that might be considered by parents as undesirable. Among a population of approximately 1500 people, there is one main shop, three take-away outlets and a school canteen. The 20 or so households living in an area of the community called “middle camp” live within easy walking distance to the nearest take-away, with some houses directly opposite.

I’ve tried so many times to stop them from eating certain foods and drinks, I’ve tried to help them eat the right kind of ngatha [food] or what’s best for them (Elder woman speaking, 2004).

A Yolngu ngatha [food] curriculum: integrating two epistemologies

In accepting the existence of a changed learning structure for children, interviewees considered the formalised school environment to be an appropriate setting for children to learn the Yolngu food system, as well as the family environment. The Indigenous NT Marine Ranger Program was also considered an appropriate structure to provide integrated learning of the Yolngu food system for young people.
Interviewees strongly recommended that the Yolngu food system form the backbone of the school curriculum with the involvement of knowledgeable community people.

Equal importance was given to the learning of the Yolngu food system in a formalised setting as to the learning of maths and science. Within maths and science there are basic principles underpinning the values and belief system of western society. One interviewee related the learning of maths and science principles to the indoctrination of children in Western epistemology. In this respect, interviewees made it very clear that Yolngu are interacting with two food systems which symbolise two cultural systems and therefore two epistemologies. For this reason, the teaching of the Yolngu food system within the formal education of children is as paramount as the teaching of the Balanda food system. Three people with whom I had an indepth discussion about learning, believed that learning about the processes related to the Yolngu food system was essential to setting a strong foundation on which to build further knowledge, and an understanding about Balanda food and life in general.

New generation is growing now [learning like this] because they first taste they have is Balanda ngatha the Balanda ngatha introduced to us. If introduce both, then they will choose (Elder man speaking, 2005).

Learning and teaching, and then there is methodologies and there are processes in all of those things ngathapuy dhawu [stories about food] that need to be come out and on to the table... like Yolngu food, it is not just collecting and gathering, it is also ways of learning and developing how we can be able to survive today (Elder woman speaking, 2005).

Then there is also the need to learn their totem….yothu [child] that makes them feel confident …and for dingu [cycad], I’m thinking about dingu [cycad].it’s part of life….Yolngu, like for me or for my children, we have to take the bad parts out…when they cleanse [referring to the process of preparing the cycad nut to leach the poison], that’s the part where we as Yolngu, has to take out those bad parts and put us into position where we feel free of ourselves, free of Yatjkurr [bad] things, free of yatjkurr [bad] ngatha [food], ngarali [cigarettes], where we can feel whole body feeling good and well (Elder woman speaking, 2005).
Yolngu agency

Freedom to choose

A dimension to learning that was strongly emphasised in relation to food and other aspects of Yolngu life was the concept of “freedom to choose”. A sense of freedom was associated with Yolngu foods as opposed to a Balanda food system that was perceived as structured and dependent on strict time keeping:

You balanda can only eat on set times but for us Yolngu people we can eat anything anytime starting from morning up till sundown, we have this freedom to eat anything at anytime, and when our children grow up they learn things from us…..(Elder man speaking, 2004).

All the food the balanda gave us was according to the time (Elder man speaking, 2005).

The construct of “agency” seemed highly valued and fiercely defended. Insight into the significance of agency from a Yolngu perspective as expressed through people’s narratives and comments supports the principles of social learning and supporting social change as a public health strategy. It challenges the all too commonly practiced didactic style of individual-centred education. People expressed the right to choose even in the knowing that the consequences of the decision may have ill effects:

Own decision…they’ll make their own decision (Workplace focus group, 2005).

Fine line between being patronising and encouraging….I [take-away employee] suggested to a child to buy a fruit, banana or egg, instead of a lolly… “it’s his money” said [rebuked] the mother (Field notes, 2005).

Attempts by health professionals, both Aboriginal and non-Aboriginal, to influence a person’s choices were considered value-laden and offensive:
We can’t change, people have to change themselves, habit or behaviour, the cycle we see. You can’t change people buying coke, fish and chips, that’s crazy…we can’t judge your life, what you want, no…..we are talking about something that needs to change. Not for us but for the generation coming (Workplace focus group, 2005).

Attempts to encourage a different behaviour through direct words or actions, could also be perceived as forcing and trying to exert power over another person:

Ngarraku [my] decision, ngarraku [my] thinking, don’t tell me what to do…forcing …….leading by example (Workplace focus group, 2005).

We’re not there to force them but to help them, so that they can later [have] good food and some small ngatha they want (Young man speaking, 2004).

One interviewee referred to people’s rights to make “unwise” choices, comparing the right for people to drink kava [an illicit substance in the community as it is not licensed] to the rights that Balanda have to choose cigarettes even though they may understand that the consequence of smoking is detrimental to their health:

People want kava and see it as their right if balanda are allowed or have the right to smoke and it is killing them, then it is our right to drink kava. We need to make it so that Yolngu are controlling the kava and the kava is not controlling Yolngu. Kava is not like alcohol. At Galiwin’ku at the moment there is a lot of alcohol. It causes violence and anger and fighting (Field notes, 2005)

There was also an acceptance of “this is how life is for Yolngu” and it was inferred that Yolngu live and eat differently to Balanda and have different values and beliefs, and for these reasons people in the community may not consider information coming from outside relevant to their situation:

This is Yolngu…how we are living our life (Young man speaking, 2004)

Yolngu sometimes make a mistake…. [they think] I know how life is…so they don’t listen to information that other people may have, like Balanda who come (Young man speaking, 2005)
Despite this strong sense of interpersonal autonomy, I constantly observed the ongoing exchange of educational information between people and the chiding of people for smoking or enacting perceived “deviant” health behaviour. However the social context was key to the exchange of information, and the acceptance or rejection of the information by the recipient.

I had the privilege of accompanying an older woman who was employed as a “strong women worker” with the health centre and had organised to take a group of young pregnant women to a place away from the town for an education session. In the most respectful, caring and nurturing fashion, the strong women worker through her words and actions showed each of the young women that they were valued and cared for. The health message was short, the caring and bonding was strong, and afterwards everyone collected and shared mangrove worms and other shellfish. This woman although older and perhaps perceived by the young women to be in a more powerful position, showed the utmost respect to the young women and they responded positively.

7.5. Discussion

The perspectives presented here demonstrate a holistic view of eating and food behaviour, situated within the wider context of society and the environment, the past and the present. Food is not considered in terms of nutrients and disease. Food is considered as belonging to a system, an epistemology and is connected with the very lives and actions of people. A key finding to emerge from this study is that good nutrition is bound in maintaining Yolngu identity in a fast encroaching western dominated society that holds values and beliefs different to those of Yolngu society. In traditional society, hunting and gathering formed the bases of the economic and organisational structures of Yolngu society and therefore Yolngu identity. A widening disconnection from the Yolngu food system is undermining the very being of Yolngu. This is contributing to a life out of balance of which poor nutrition is part. This way of viewing food and nutrition supports a systems/social-ecological approach to understanding the determinants of poor nutrition and to considering change for nutrition improvement. Such an approach demands more attention to the
interactive nature of multilevel influences on behaviour rather than concern with demonstrating causal relationships.417.

Attention to the importance of the Yolngu food system in maintaining Yolngu identity helps to understand Yolngu perspectives of the Balanda food system. There are defined rules and structures associated with the Yolngu food system that guide eating behaviour. Indeed within any given culture, there are rules that govern the set of practices and representations connected with production, gathering, preparation, distribution and consumption of food.409. From this perspective, Balanda foods belong to a different system with different rules and representations. They are considered convenient and “tasty”, but foreign, suspicious and not well-understood. A serious misconception of Yolngu that emerged from this study was that non-Aboriginal people have a comprehensive understanding of their food system that enables them to live in balance with their food environment.

The very different way of perceiving food when compared with the way Anglo-Australians perceive it, is similarly found in the work of Fischler who stated that “to identify a food, one has to “think” it, to understand its place in the world and therefore understand the world, and in particular to distinguish, order and classify the elements of which it consists” (p 290).

In thinking about food in relation to a cultural group’s epistemology, Fischler offers insight into the tensions associated with assimilating new foods from a different culture into a known culinary system. Fischler states that “the absorption of a food incorporates the eater into a culinary system and therefore into the group which practices it”. Therefore, “the eater’s life and health are at stake whenever the decision is taken to incorporate, but so too are his place in the universe, his essence, his nature, in short his identity” (p 281).

While Yolngu may purposely resist incorporating the Balanda food system into their culinary system for the reasons expressed by Fischler, Fischler demonstrates that the practicalities of doing this are actually problematic because of industrialized food production and social changes that define the manner of food distribution. Hence the difficulty for both Aboriginal and non-Aboriginal people, of understanding a
food system that is controlled by forces beyond the individual or family. This is particularly salutary in relation to nutrition education. Contextualising Balanda food in relation to origin, history, processes of production, distribution and preparation may have more relevance for Yolngu than focusing solely on the nutritional attributes of particular foods.

The constituents of healthy eating identified by interviewees in this study, all form the basis of the Australian Dietary Guidelines. This demonstrates a broad awareness of the dietary recommendations promoted for all Australians. The concepts of: balance; variety; natural, fresh food as opposed to processed and manufactured food; dietary control; fruits and vegetables; and limited fatty foods and sweet foods; were all identified as important constituents of healthy eating. The similarity of these concepts with those found in other studies supports the view of Povey et al that different cultural groups in general have a common understanding of healthy eating even though the contexts that eating occurs within are diverse.

However, as shown in the previous chapter, people are not eating in accordance with the recommended dietary guidelines. This study provides insight into the reasons for the incongruence between knowledge and behaviour. A prevailing assumption among many non-Aboriginal people is that Aboriginal people choose unwisely from European foods because they lack knowledge of food values and perceive all European foods as “good”. The findings from this study clearly show that people do make distinctions between healthy and unhealthy foods and clearly treat introduced foods circumspectly, particularly manufactured foods. The salience of knowledge as an important determinant of food choice has been shown to be largely over-estimated. Emphasis on knowledge, with disregard to other determinants of food choice, perpetuates the scenario of victim-blaming or blaming the individual for making poor food choices.

A key finding of this study is that knowledge of the constituents of healthy eating is largely compromised by circumstances as well as by structural constraints. Similarly, it has been shown that individuals of low SEP compared to high SEP individuals, are least likely to eat in accordance with recommended dietary guidelines, not for reasons of ignorance or lack of motivation but largely due
to household socio-economic circumstances and structural constraints. Among households in the Brisbane metropolitan area, household income was found to be a stronger discriminator than education in determining the variety and regularity of fruit and vegetable purchases.

It is clear from the perspectives presented in this study that the unintended consequences of centralisation, reinforced and complicated further by conditions of poverty, are key determinants of food choice. Due to large gatherings of people in households, certain eating behaviours have resulted that have ensured cultural integrity while guaranteeing food sustenance. Overcrowding, and associated wear and tear on household infrastructure and unequal distribution of household responsibilities, poorly equipped houses, and inadequate housing maintenance, have reinforced the consumption of convenience foods that are generally of poor nutritional value. More importantly, the cost of living coupled with low incomes and other economic stressors has supported a diet where the quality fluctuates with the fortnightly pay cycle.

As shown in Section 7.4.2, interviewees clearly indicated bread, flour, sugar and milk powder as the “long life foods” and dietary staples, and identified fruit and vegetables missing from the diet. Familiar foods that would satisfy hunger and avoid wastage were considered important. This dietary pattern generally described by interviewees fits with the quantitative assessment of diet reported in Chapter 5. The reliance on relatively lower cost/high energy foods supports the economics of food choice theory proposed by Drewnowski and discussed in the previous chapter.

The ‘feast and famine’ cycle referred to by the interviewees as described in Section 7.4.2, is similar to that reported among single low income families in Victoria by Crotty et al. Among these families the fortnightly pay cycle resulted in a halving of the quantity of fruit and vegetables purchased in the off pay week and a much lower fortnightly expenditure on meat compared to food expenditure patterns reported for wider Australia. Household food insecurity has been shown to be inextricably linked to financial insecurity.
The meaning, experience and consequences of food insecurity for Aboriginal people have not been explored. Food security implies that all people, at all times, have access to enough food for an active, healthy life “without resorting for example, to emergency food supplies, scavenging, stealing and other coping strategies” \(^{432}\). As detailed in Section 7.4.2, people in general resort to strategies on a regular basis to cope with food insecurity. The question in this context relates to understanding if these coping strategies are socially acceptable and are enacted in the Yolngu ethos of social relativism or are indicative of unacceptable food insecurity. In a context where the majority of the population are low income, and no free food programs or financial assistance programs exist except for the school breakfast program, families are expected to carry the burden of food insecurity.

While food insecurity was expressed as an everyday reality by interviewees, the ability to access traditional foods for some people and the cultural act of sharing provided a safety net. However as Finlayson points out, these social networks are essentially welfare-based and can easily be overburdened with demands that cannot be met \(^{393}\). Financial burdens in households are not always equitably distributed resulting in excessive stressors on certain household members particularly the “core” members of household units, such as those on Aged Pensions \(^{393}\). The trend towards individualism, spurred on in the community by abuse of illicit substances, without accompanying economic growth and opportunities for paid employment beyond CDEP, may further expose people already vulnerable to falling through the social safety net. Radimer et al \(^{285}\) demonstrated that not all members of a household are affected equally by food insecurity. Similarly in the present study, interviewees indicated that children and sole female parents were particularly vulnerable to food insecurity.

An important theme to emerge from this study was the dietary implication of the high cost of food relative to people’s income, exacerbated by the cost of unavoidable expenditures. Among the study population these “unavoidable” expenditures related to actions that reaffirmed social ties and relationships, which are central to Yolngu being. Interviewees related food affordability not only to the cost of food, but to the total cost of living relative to income, in addition to the demands on income, particularly from use of illicit drugs. The demand on limited resources for illicit
drugs is exacerbating the problem of food insecurity. Because of these demands, as Smith concluded based on observations in two Aboriginal communities, when increased income is available it may not necessarily be spent on better quality food.

The NT Food and Nutrition Policy has placed food affordability as a priority policy area together with food availability and quality. The perspectives of people presented in this chapter clearly show that a comprehensive model is needed to understand and address food affordability.

In nutrition practice, there is a need to situate food within its economic and social context. There is no question that active intervention is needed to reduce and monitor the cost of food and goods available in remote communities. In an environment where pricing is not controlled by competition and many retailers have a monopoly, price capping needs to be considered. Besides reducing the cost of food and other goods, opportunities for people to generate income need to be pursued and supported. This approach has been taken among low income people in developing countries. Bigrove and Popkin showed among urban Philippino women that involvement of low income women in the non-wage work sector such as in cottage industries and small businesses improved women’s nutritional and dietary status. The Tongan government is considering ways of promoting the development of sustainable Indigenous fishing and farming industries to overcome food insecurity.

An important theme to emerge from the interviews was the perception of the strong influence of the family environment on the development of children’s food preferences and eating behaviours. Important influences on young people’s food choices as detailed in Section 7.4.3, such as role modeling, television viewing and child-parent/kin interactions have also been suggested by other studies. Early in the life of the child, interviewees emphasized the mother’s influence on the development of the child’s eating behaviour. The “mother” in this context can also refer to kin other than the biological mother who have a mother-child relationship with the child. The influence of the mother’s eating behaviours, attitudes, and child-feeding practices on shaping children’s preferences and intake patterns is supported in the literature. Knowledge that eating patterns are developed and learned at a young age suggests that poor eating practices associated with environmental
constraints, in turn, become learned and habitual. This indicates that influencing the development of children’s food preferences and intake patterns requires both intervention to modify the environment and intervention to modify social norms.

A final key theme to emerge from the data was the social, cultural, spiritual, and economic role of the traditional food system in achieving improved nutritional health. The traditional food system is a particularly salient reference point for influencing eating behaviour. In a context where there are two food systems, it has been shown that a good knowledge of one domain, provides a solid foundation for the understanding of the second domain417;436. Kuhnlein437 reported similar concerns among the Canadian Indigenous people to those expressed in this study, that decreasing use of traditional food was associated with deteriorating health in communities and loss of traditional cultural structure.

In Australia, by only considering the nutritional contributions of traditional foods, we have failed to recognize the broader social, educational, economic and cultural contributions. This potentially rich resource base for Yolngu has been overlooked. Yolngu however firmly believe their future lies in the strength of their culture, where traditional food plays an integral part438. A refocus on traditional foods in nutrition-related practice and policy would serve to value the social, cultural and nutritional value of traditional food and provide a meaningful reference point for education relating to the Balanda food system.

A group of Yolngu has been seeking solutions to reclaim their heritage as educators and role models for their children. An outcome of this has been the conceptualization of the Yothu Yindi curriculum for schools developed in 2000439. The goal of the Yothu Yindi curriculum was for young children to develop literacy skills through their own language group and learn about the world through the Yolngu worldview. Integral to the curriculum was the learning of plants and animals from a Yolngu perspective and the rules associated with their procurement, conservation, preparation, distribution and consumption439. Due to lack of funding, resources and support, The Yothu Yindi curriculum was not able to be developed and implemented. In the meantime an Indigenous organization, Yalu’ Marnggitinyaraw
has formed. This organization is striving to address health through re-establishing Yolngu health and education systems.

Considering the role of traditional foods as expressed by interviewees in improving nutritional health and their concern that young people ‘are losing the taste’ for traditional foods, the next chapter explores young people’s perceptions of both traditional and store foods. In light of the evidence thus far in relation to economics being a key driver of food choice and knowledge of nutritional requirements less so, the ability of young people to make knowledgeable food choices is examined.
Chapter 8. Food preferences and perceptions of healthy food: Can young people make knowledgeable food choices?

The previous chapter examined influences on diet and nutrition from the perspective of people in Galiwin’ku community. The voice of young people was largely absent. A major concern of the older people interviewed, focused on younger people in the community, and their apparent indifference regarding Yolngu food and concurrent desire for convenience food. Phase 1 of this research also identified young people as a critical group to support to prevent type 2 diabetes and related conditions. The purpose of this chapter was therefore to explore young people’s perspectives in relation to food. This chapter presents the findings from a school-based activity to determine food preferences of young people and their ability to make health informed food choices as part of the ecological and educational assessment phase of the research.

8.1. Introduction

Young people throughout the world have continued to perplex older people as they strive to embrace the opportunities that they perceive wider society to present. The previous chapter demonstrated that older people of Galiwin’ku, were struggling to make sense of the present situation, where their inherent role of nurturing, educating and guiding young people was perceived to have changed. Older people worried that young people were losing “the taste” for Yolngu foods and that their apparent disinterest in Yolngu food, provided few opportunities for young people to receive, and inturn, become the contemporary guardians of Yolngu knowledge. The older people interviewed referred to the maintenance of the Yolngu food system as key to upholding Yolngu law and restoring health. The diminished dependence on Yolngu food by people in general, and the wider societal implications of this, was considered a key contributor to the present sickness experienced by the community and associated high prevalence of type 2 diabetes and related conditions.
In all cultures, food is symbolic of cultural heritage and is a crucial element in defining who we are\textsuperscript{423}. The previous chapter demonstrated that in addition to cultural meanings, food choice is largely not an individual choice but is tied with wider influences of kin, community, society, the past and the present. Current behavioural science literature downplays the importance of knowledge as a predictor of eating behaviour and emphasizes the layers of influence\textsuperscript{60;61}. In the Aboriginal context where English is spoken as a third or fourth language and literacy levels are low, knowledge is often targeted as a key determinant of eating behaviour. In a study on child growth conducted with a remote community in North-East Arnhem Land, Smith\textsuperscript{159} associated lack of knowledge about “bad foods” and shop foods with poor child feeding practices. The assumption that knowledge is a key predictor of eating behaviour underpins many of the strategies implemented to improve nutritional status among Aboriginal people.

Although a number of studies in Canada have examined the contemporary food preferences of young Indigenous people\textsuperscript{118;440}, there is little available data pertaining to young Aboriginal Australians. Similarly, while lack of knowledge is considered to underlie poor nutrition of Aboriginal people, little empirical research has explored the relationship between knowledge and dietary intake among young people in the Australian context more generally. Part of the problem is that there are no available culturally sensitive measures and procedures by which to obtain information from young Aboriginal Australians on food preferences, food use and/or food knowledge.

Information on food preferences and food knowledge of young people would contribute to an understanding of factors influencing the eating behaviour of Aboriginal people and the development of appropriate interventions for improving nutrition. This chapter therefore aimed to explore young people’s perceptions of Yolngu food in particular, their knowledge of healthy eating and their understanding of the relationship between food and health.
8.2. Aim

To further explore from the perspective of young people, themes identified in Chapter 7 as key determinants of nutrition and nutrition improvement.

Specific aims were to:
1) develop a self-report survey instrument to be completed by youth to:
   a) determine food preferences of young people
   b) determine foods most frequently consumed by young people
   c) explore the issue of food security from the perspective of young people
   d) explore young people’s understanding of the relationship between food and health

2) develop a youth focus group interview guide to further explore:
   a) young people’s understanding of the relationship between food and health
   b) the issue of food security from the perspective of young people

8.3. Method

8.3.1. Study design

This study was conducted in two parts. Figure 8.1 illustrates the study process. Part 1 comprised the development of the study instrument and part 2 comprised its administration. The study instrument developed comprised two components. The first component used a structured questionnaire to collect information at the individual level on food preferences, foods frequently consumed, knowledge regarding “healthy” and “less healthy” foods and food security. The second component involved focus groups to qualitatively explore young people’s understanding of the relationship between food and health and the issue of food security.

The school provided an appropriate setting for this study where young people’s perspectives on nutrition could be explored.
As shown in Figure 8.1, key themes that were found to underlie nutrition and nutrition improvement as identified by engaging the wider community were used to guide the development of the study instrument for the school-based study. These themes, identified below, were:

- Food preferences, Yolngu foods and cultural identity
- Knowledge of “healthy” and “less healthy” food
- Food security and reliance on long life foods and pre-prepared foods
- Knowledge of relationship between food and health
Data on food preferences collected through engagement with the wider community informed the development of an activity as part of the structured questionnaire (self-report survey) to gather data on young people’s food preferences.

**A Participatory process**

This study was developed, implemented and the findings evaluated through a participatory process involving a MSHR research team (comprising myself and two colleagues), Yalu’Marnggithinyaraw and the Shepherdson College middle school teachers. The rationale for this approach was two-fold. Firstly, due to the limited time allocated by the school, (two, 2-hour sessions), a study instrument was needed that would enable the gathering of data on key constructs that was culturally sensitive and could be internally validated. Secondly, the generally low literacy levels of students and their profound shyness with respect to a stranger, required input from Yalu’Marnggithinyaraw and school teachers to ensure the development of an appropriate tool and its administration. Over several meetings with Yalu’ Marnggithinyaraw and the teaching staff, the most practical, culturally respectful and effective method to seek parental consent, encourage student participation and collect the required data in the time allocated was determined. This process is further described under the following section describing part 1 of the study.

**8.3.2. Ethics**

Ethics approval was obtained from the Joint Human Research Ethics Committee of the Northern Territory Department of Health and Community Services and Menzies School of Health Research; and from the Department of Education Employment and Training. Permission was obtained from the school Principal and co-operation sought with the head teachers for the middle school. A list of names of all students in middle school was obtained from the school. A research team visited each of the students’ parents or close kin to explain the school based activity and to request consent for their child to participate. Written informed consent was obtained from a parent or caregiver for each of the middle school students whom participated in the study.
Part 1: Development of study instrument

The development of the study instrument is described under the key constructs examined. It included a self-report survey instrument comprising 4 activities, and a focus group interview guide based on 6 vignettes. Techniques developed by researchers in Northern Canada\textsuperscript{118,440} to determine food use and food preferences among Indigenous populations in Northern Canada informed the development of 2 of the 4 activities. Existing questions used in the Childhood Determinants of Adult Health survey\textsuperscript{441}, the USDA Community Food Security Assessment Toolkit\textsuperscript{442} and the Kimberley Aboriginal Health Promotion Needs Assessment\textsuperscript{443} were incorporated in the self-report survey to explore food access and food security.

The self-report survey and focus group interview guide and vignettes are shown in Appendix 6 (p 435-458) and Appendices 7 and 8 (p 459-461).

Development of study instrument: Food preferences, Yolngu foods and cultural identity

To determine food preferences of community members, an activity was conducted with individuals who participated in the family- and work-based focus groups described in Chapter 7, Section 7.3. Information from this activity was used to guide the selection of foods to include in the youth survey activity to determine their food preferences.

The convenience sample consisted of 21 of the 40 focus group participants described in Chapter 7, Section 7.3. Sixteen women and 5 men, aged 8 to 65 years participated in this activity. The sex and age range of participants are shown in Table 8.1.
Table 8.1 Demographics of participants involved in food preference activity

<table>
<thead>
<tr>
<th>Group discussion</th>
<th>No. involved in focus group</th>
<th>No. involved in food preference activity</th>
<th>Gender</th>
<th>Age-range (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health centre</td>
<td>8</td>
<td>6</td>
<td>F</td>
<td>20-55</td>
</tr>
<tr>
<td>Yalu’margginthiyaraw</td>
<td>4</td>
<td>1</td>
<td>F</td>
<td>50-65</td>
</tr>
<tr>
<td>Family 1</td>
<td>3(^a)</td>
<td>-</td>
<td>1M/2F</td>
<td>30-60</td>
</tr>
<tr>
<td>Family 2</td>
<td>6(^b)</td>
<td>-</td>
<td>4M/2F</td>
<td>8-65</td>
</tr>
<tr>
<td>Family 3</td>
<td>4(^c)</td>
<td>-</td>
<td>2M/2F</td>
<td>25-55</td>
</tr>
<tr>
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<td>4</td>
<td>4</td>
<td>2F/2M</td>
<td>8-65</td>
</tr>
<tr>
<td>Family 5</td>
<td>3</td>
<td>3</td>
<td>3F</td>
<td>16-50</td>
</tr>
<tr>
<td>Family 6</td>
<td>9</td>
<td>7</td>
<td>4F/1M/4 children</td>
<td>12-45</td>
</tr>
</tbody>
</table>

\(^a\) 2 young adult men chose not to participate  
\(^b\) 3 children were present  
\(^c\) 2 women chose not to participate

**Item selection**

Each person was invited to select ten preferred foods from 230 cards, each containing one picture of one food, randomly spread on a sheet. The cards were 10cm x 8cm in size and made from photographs of food that had been printed and laminated. The food cards represented 26 Yolngu foods and 204 store foods. The selection of foods was guided by: a list of the ‘top sellers’ through the community store; observations of foods commonly eaten by different age groups and collected on hunting trips, specific brands of different foods commonly purchased, and foods purchased by Yolngu when in Darwin; and information from community members, store and take-away managers, regarding foods commonly purchased and consumed. At this stage, as many foods as practical were included, so as not to restrict or preordain people’s selection of preferred foods and to indicate to respondents that there was no right answer.

**Item reduction**

Eighty-nine different foods were selected as preferred foods by the participants including 26 Yolngu foods and 63 store foods. Seven additional store foods were included in the list of foods to be used for the school activity. This was on advice from the school teachers who thought the list of foods derived from the wider community did not fully reflect the foods observed to be commonly consumed by
young people. Yal’Marnggithinyaraw advised that 12 additional Yolngu foods be included in the school study to better represent the Yolngu food categories.

Small, coloured pictures of 108 foods in total were presented on 4 x A4 sized pages. Pictures of the 38 Yolngu foods were mixed with the 70 pictures of store foods to eliminate any bias which might arise from the sequence of presentation. This was presented as the first of the four activities comprising the self-report survey instrument. When administering the survey, students were asked to consider each of the foods and tick the foods they really liked (Appendix 6, p 435).

A question adapted from the Kimberley Aboriginal Health Promotion Project Wave 2 Needs Assessment was included in the self-report survey as a short question to further assess student’s perception of Yolngu foods.

Knowledge of “healthy” and “less healthy” foods

A second colour copy of activity one was included in the self-report survey instrument to assess young people’s knowledge of “healthy” and “less healthy” foods. When administering the self-report survey, youth were asked to consider each food picture and to tick the foods they considered as “good for your body foods”.

To internally validate data collected on food preferences and knowledge of “healthy” and “less healthy” foods, a third activity was included in the self-report survey. For this activity, youth were asked to draw and comment on two foods: a food they really liked and was good for their body; and a food they really liked and was not good for their body.

Reliance on long life and pre-prepared foods

Food frequency questionnaires (FFQ), although not used in Australia among Aboriginal populations, have been used extensively in Canada to assess consumption of particular foods. In the Canadian context, the FFQ has been found to be a reliable measure of food use among youth. A FFQ was developed in consultation
with Yalu’Marnggithinyaraw, based on the method used by Wein and Freeman\textsuperscript{118} and adapted to suit the cultural context of the present research.

A pictorial format\textsuperscript{445} was adopted based on the generally low literacy levels of students and the multiple names ascribed to Yolngu foods in association with different language groups. Forty-eight store foods and 36 Yolngu foods were included in the FFQ. These foods represented the:

- indicator foods included in the short questions developed by the Australian Food and Nutrition Monitoring Unit\textsuperscript{446}
- Yolngu food categories, and
- a variety of other foods Aboriginal informants observed young people to commonly consume.

A four-point response scale from the Kimberley Aboriginal Health Promotion Needs Assessment survey was used: lots of times; sometimes; hardly ever; or never\textsuperscript{443}. The response scale was also presented pictorially with diminishing circle sizes representing a lower frequency of consumption. Students were asked to consider how often they consumed each of the Yolngu foods listed, when in season.

**Food access and food security**

Existing questions were incorporated in the youth survey to explore youth access to food and food security. To explore young people’s access to food, three questions adapted from the Childhood Determinants of Adult Health Questionnaire 3: Dietary Questionnaire\textsuperscript{441} were included. Two questions were included to assess food security and hunger. These questions were adapted from the USDA Community Food Security Assessment Toolkit\textsuperscript{442}. The question on hunger was identical to that previously used in the Kimberley Aboriginal Health Promotion Needs Assessment survey\textsuperscript{443}.
Knowledge of relationship between food and health

A focus group process was designed to provide group level data on young peoples’ knowledge of the relationship between food and health and issues of food security and to compare and contrast group level data with individual level data collected through the self-report youth survey. Six vignettes depicting every day events that occur in the study community were commissioned. These are shown in Appendix 7 (p 459-460). A vignette depicts a short story in written or pictorial form about hypothetical characters in specified circumstances, to whose situation the interviewee is invited to respond\textsuperscript{447,448}. The vignettes captured aspects of the key constructs ascribed earlier in this chapter. A strength of vignettes is that they enable behaviours to be explored in context, in a less personal and therefore less threatening way\textsuperscript{449}. Two sets of the six vignettes were designed: one set for the female students depicting a female as the central character and a replica set for the male students. The face validity and cultural appropriateness of the vignettes was tested with a group of four mature-aged Aboriginal men and women in the study community and modified accordingly by the artist.

Pre-testing study instruments

The self-report survey instrument, as shown in Appendix 6, was pre-tested with a convenience group of three Aboriginal children aged between 10 and 13 years, and six mature-aged Aboriginal women. Wording of the questions was modified to eliminate ambiguities as a result of pre-testing. For example the expression “foods that are good for you” was modified to “foods that are good for your body”. Questions were translated to Yolngu matha. The interview guide to be used in the focus groups with the vignettes was pre-tested, modified and translated to Yolngu matha. The interview guide and vignettes are shown in Appendices 7 and 8.

Administration of the self-report survey was role-played with the mature-aged women employed to be moderators. The notion that there was no right or wrong answer was reiterated during the role-plays as it was a challenge for the older women particularly, to switch roles from a culturally-defined role as educator and nurturer, to one of moderator.
Part 2: Data collection

Sampling strategy

The study participants were young people, 12 years of age and over, living in the study community and attending the Shepherdson college middle school. The convenience sample (n=27) comprised 20 males and 7 females, 12 to 16 years of age, representing the regular attenders of the 52 students enrolled in the middle school and approximately 19% of the 12-16 year age group in the community. All middle school students in attendance at school on the day the activity was conducted participated in the study.

Of the 27 students completing the survey, 18 students (10 males and 8 females) participated in the focus groups as 9 students were on a school excursion and were unavailable to participate. Four focus groups were conducted with 4 to 5 students in each group. One group was an all male group and one group an all female group.

Questionnaire activities

To encourage students’ participation in a culturally safe environment, the students completed the self-report survey in four groups of six to eight students with the assistance of a Yolngu moderator and a non-Aboriginal researcher. Instructions for each activity included in the self-report survey were written in Yolngu matha and repeated in language by the Yolngu moderator. Students received assistance in completing the survey as required. Six of the middle school teachers also assisted the students. Some students worked independently, others requested one-on-one assistance. All students completed the activities within the 90 minutes allocated. Students received a small snack in appreciation for their participation.

Focus group process

For all focus group sessions, a Yolngu mature-aged woman acted as moderator and conducted the focus groups in language. I was present as observer and note-taker.
The focus group process involved students looking at each vignette consecutively and responding to the question asked by the moderator. The moderator encouraged students to respond while avoiding questioning individuals directly. Care was taken by the moderator to probe without leading the student’s responses. Video-recorded focus groups lasted approximately 20 minutes. Following each focus group session, the recording was transcribed and translated and notes on the group interaction were made.

8.3.3. Analysis

Data collected from the self-report survey were entered into a Microsoft Excel spreadsheet and analysed as outlined below. Basic descriptive statistics were computed for each measure. Cut-points for measures of food preference, knowledge of food and frequency of consumption were assigned based on the percentage of students selecting each of the foods. Preliminary analysis of the individual level data was presented and discussed with two of the middle school teachers, the Assistant Principal, and Yalu’ Marnggithinyaraw.

Preferred foods

A score was given to each food picture based on the number of times the food was selected as a preferred food by youth. Foods were then grouped according to the most liked, moderately liked, and least liked, based on respective scores of ≥20; 15-<20; <5. A score of ≥20 corresponded to ≥75% of the students selecting the food as a preferred food; a score of 15-<20 represented ≥55% -<75% of students selecting the food; and a score of <5 corresponded to <20% of students selecting the food as a preferred food.

Knowledge of food

Each of the 108 foods received a score corresponding to the total number of respondents that ticked the food as “good for the body”. A score of ≥20 was coded as a “good for the body” food and corresponded to ≥75% selecting the food as a
“good for the body food”. A score of ≤5 was coded as a “not good for the body” food and corresponded with <20% of respondents selecting the food as a “good for the body food”. A score of >5-<20 indicated uncertainty among the group in classifying the food as a good for the body food.

**Drawing activity**

A list of all foods drawn by the students was made. A score was given to each food corresponding to the total number of times the food was drawn. Responses to the open-ended questions were analysed qualitatively for frequency of recurring themes.

**Frequency of consumption**

Each of the 84 foods was rated on a four-point scale (“lots of times”, “sometimes”, “hardly ever” and “never”) by each student (n=27). A score was then assigned to each food that corresponded with the total number of respondents that reported to consume the food. Store foods and Yolngu foods were analysed separately. The cut-off to determine “most frequently” consumed foods was ≥20 for store foods, corresponding with ≥75% of respondents reporting to consume the food “lots of times” and ≥23 for Yolngu foods, corresponding with ≥85% of respondents reporting to consume the food “lots of times”. A higher cut-off was assigned for Yolngu foods as the distribution in reported frequency of consumption was skewed to consuming foods “lots of times”.

**Focus groups**

The translated student responses and comments for each of the 6 vignettes were analysed for recurring themes. As a form of member checking, themes emerging from the focus groups were discussed with DY and EM as each focus group was being transcribed and translated. Themes were compared and contrasted with the data collected through interviews, conversations and observations conducted in the wider community as part of the larger study.
8.4. Findings

8.4.1. Preferred foods

For the young people who participated in the study, Yolngu foods were identified more frequently than store foods as preferred foods (Table 8.2). Among the ten most liked foods, eight were Yolngu foods (fish, magpie goose, wallaby, mud mussels, cockles, turtle, oysters and turtle eggs) and two were fresh fruits available through the community store (banana and grapes). Among the moderately preferred foods, damper, pears, watermelon and oranges scored high with an assortment of Yolngu fruits (nyik [“black currant”; Antidesma ghesaembilla], balk palk [bush peanut; Sterculia quadrifida] and mupan [wild peach; Terminalia carpentaria]), long necked turtle, wild honey and shell fish including mangrove worms (Table 8.2). Both white sugar and brown sugar, lollies, ice cream, tinned meat and vegetables, diet coke, syrup, and two Yolngu foods, wak wak [water lily] and dhirrang [Root corm of waterlily; Nymphaea violacea] were the least preferred foods (Table 8.2). Dhirrang is only available on the mainland and wak wak [water lily] is no longer commonly collected by people of Galwin’ku although people living on their homelands still access this food (Personal communication, Yalu’ Marnggithinyaraw 2003). Other Yolngu foods, not commonly available, such as dingu [cycad bread] did not rank as preferred foods. Vegetables were neither the least nor the most preferred foods. Damper was identified as a preferred food, however flour was rated as a least preferred food, indicating a literal interpretation of the food pictures by students.

The majority of students (83%) reported that they strongly desired Yolngu foods. Only one student reported to desire Yolngu foods only a little bit.
Table 8.2 Foods ranked according to preference, school study

<table>
<thead>
<tr>
<th>Most preferred ≥20</th>
<th>Moderately preferred 15-&lt;20</th>
<th>Preference Score 10-&lt;15</th>
<th>&gt;5-&lt;10</th>
<th>=5</th>
<th>Least preferred &lt;5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>Damper</td>
<td>Nyoka [mudcrab]</td>
<td>Hot chips</td>
<td>Spaghetti</td>
<td>Dhanggi [cocky apple]</td>
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<tr>
<td>Magpie goose</td>
<td>Mangrove worm</td>
<td>Apples</td>
<td>Eggs</td>
<td>Rakay [edible rush corm]</td>
<td>Dingu [cycad nut]</td>
</tr>
<tr>
<td>Wallaby</td>
<td>Bunybu’ [shellfish]</td>
<td>Narrani [bush apple]</td>
<td>Apple juice</td>
<td>Fried fish</td>
<td>Peas</td>
</tr>
<tr>
<td>Dhampala</td>
<td>Watermelon</td>
<td>Djambang [tambarind]</td>
<td>Broccoli</td>
<td>Chiko roll</td>
<td>Pie</td>
</tr>
<tr>
<td>Diyamu</td>
<td>Oranges</td>
<td>Raga [white berry]</td>
<td>Bread</td>
<td>Hot dog</td>
<td>Tea</td>
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<tr>
<td>Turtle</td>
<td>Minhala [long necked turtle]</td>
<td>Lettuce</td>
<td>Meat (steak)</td>
<td>Packet chips</td>
<td>Coke</td>
</tr>
<tr>
<td>Namura</td>
<td>Nyik [black currant]</td>
<td>Pumpkin</td>
<td>Noodles</td>
<td>Chewing gum</td>
<td>Chicken</td>
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<tr>
<td>Grapes</td>
<td>Mupan [wild peach]</td>
<td>Spite [lemonade]</td>
<td>Rice</td>
<td></td>
<td>Cake</td>
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<tr>
<td>Banana</td>
<td>Pears</td>
<td>Celery</td>
<td>Pizza</td>
<td></td>
<td>Honey</td>
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<tr>
<td></td>
<td>Balkpalk [bush peanut]</td>
<td>Water</td>
<td>Liver</td>
<td></td>
<td>Lollies</td>
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<tr>
<td></td>
<td>Guku [wild honey]</td>
<td>Stingray</td>
<td>Savoury biscuit</td>
<td>Tinned beef</td>
<td>Ice cream</td>
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<td></td>
<td>Dhirrang [water lily root corn]</td>
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<td></td>
<td>Flour</td>
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<td></td>
<td>Tinned food</td>
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<td></td>
<td>Diet coke</td>
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<td></td>
<td>Ngan’ka bakarra [green plum]</td>
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<td></td>
<td>Iced coffee</td>
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<td>Wak wak [water lily]</td>
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<td>Brown sugar</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>White sugar</td>
</tr>
</tbody>
</table>
8.4.2. Knowledge of food

“Good for the body”/”not good for the body” foods

Not good for the body foods

For each of the foods commonly promoted to be high fat or high sugar foods such as coca cola, take away chicken wings, dim sims, pies and ice cream, 80% or more of the students identified the food as “not good for the body”. Coca-cola was the only food where 100% of the students agreed that it was not good for the body. Of interest is that 7 out of 25 students considered “Sprite”, an aerated added sugar beverage, to be “good for the body”. One student in the focus groups referred to “Solo”, another sweet aerated drink as a healthy food. This uncertainty regarding the health-promoting qualities of aerated sweet drinks may reflect the mixed and conflicting messages young people receive through the media and other education channels as alluded to by an interviewee in Chapter 7. It may also indicate that association of a particular food with “bad”, as in the case of coca-cola, may not be generalised to similar foods.

Good for the body foods

The foods identified as the most preferred (Section 8.4.1) and several other foods (watermelon, sweet potato, weetbix, apples, tomatoes, longbums [mollusc] and nyik [black currant]) were consistently considered by students as “good for the body” foods. The majority of students indicated vegetable foods to be good for the body, however the percentage of students indicating fruit as a good for the body food was higher than that for vegetables. There was low agreement between students in identifying other foods considered to be good for the body. This was particularly so for the “core foods” or the foods that are not usually promoted to be either high in fat or sugar, such as bread, milk, eggs, baked beans, cheese, rice and flour.

Uncertainty among the students on how to classify some foods was not unique to store bought foods. There was low agreement between students in classifying one quarter of the Yolngu foods. More than half of the students did not identify dhirrang
[waterlily root corm], ganguri [yam], bidala [wallaby liver] and wak wak [waterlily] as good for your body foods. There was even less agreement between students in classifying mudcrab, wawuru’ [edible fruit], rakay [white berry], nganj’ka bakarra [green plum], dingu [cycad bread] and ṃunjugu [northern kurrajong]. Most of these Yolngu foods however, except for mudcrab, are unfamiliar to students as they are not available on the island and are not commonly consumed. It is likely that the low agreement between students in classifying some of the Yolngu foods reflected their lack of familiarity with the foods rather than lack of knowledge regarding their health value.

**Drawing activity**

*“I eat good food sometimes, sometimes I eat take away food…..it makes me weak”*

When students were asked to draw a food they really liked and was good for their body, 85% of the students drew fish, stingray, turtle meat, turtle eggs or fresh fruit, particularly watermelon: 58% included a Yolngu food and 54% included a fresh fruit. Thirteen students drew more than one food. Other foods commonly drawn were ‘fresh milk’, bread, damper, a sandwich, weetbix, file snake, dugong, mudcrab, water and fruit juice.

Taste attributes dominated as the reason given for liking a food. Examples of the students responses that related to taste were: I like the food because it’s “sweet and juicy”; “it’s very tasty” and “I like turtle because the meat…it tastes good”. Other reasons given by the students related to health attributes such as: “it’s good for me”, “I like turtle because it gives me iron to make me strong”, “I like fresh milk because it’s good for my body”. One student indicated the cultural attributes of eating fresh food: “stingray, turtle and crab, I like fresh foods, manikay [the songs attached to the food] and bungul [the ceremony associated with the food], these are my mother’s grandmother’s totem”.

In addition to indicating that the particular food was “good for me”, half of the students identified specific health attributes in association with the food, such as
“helps me with my eyesights”, gives me lots of energy”, having strong iron in me makes me move”, “milk good for my teeth”, “they make me strong”, “the food give me healthy teeth and good for the body, long life”, “makes my body strong”, “the people needs to get healthy”.

The foods drawn by the students and identified as “not good for the body” foods were coke, cheeseburger, pie, bubble gum, lollies, hot chips, lemonade, savoury biscuits, iced coffee, white sugar, chewing gum, cake, potato crisps and hotdog: 44% included coca-cola as a “favourite food” and half of the students included a convenience food such as a pie, hotdog and hot chips. Similarly to “good for the body” foods, taste and pleasure attributes such as sweetness and saltiness dominated as the main reason for liking a food considered by the students to not be good for the body. Examples of student responses were: “coke is black and sweet and I like it”, “bubble gum, candy and coke gives me lots of energy and makes me go crazy”, “I like pie because it's nice and hot and too much salt”, “I like this food because it’s sweet”, “because tastes salty”.

Foods considered not good for the body were also associated with excess salt, sugar, fat and/or caffeine. The following statements were made by students: “these foods are not good for me because it’s sweet and lots of sugar and lots of salt”, “it has lots of sugar and caffeine”, “sometimes I like to eat T-bone and sometimes I not like because T-bone has too much fat”. Students stated specific health risks in association with particular eating habits and foods they liked and considered not good for the body. Examples of student’s responses are: “bad eating creates diabetes”, “because they create heart disease”, “the cakes not good for me because it makes my teeth break”, “too much could make you sick”, “makes me weak”, “destroy body”, “bad for teeth make you tired”. 
8.4.3. Most frequently consumed foods

Balanda foods

The foods reported to be consumed most frequently by students were damper, rice, fish, bread, porridge, cornflakes, milk, fruit, sweet potato, fruit juice, raw vegetables, water and tamarind. While some of these foods correspond with observations of foods commonly consumed by young people and measures of store-food-turnover as described in Chapter 5, others do not. Flour, (used to make damper), rice, bread, porridge (rolled oats), milk powder and fruit juice contributed significantly to total community level energy intake as shown in Chapter 5. Fruits and vegetables, although liked, do not qualify as main foods purchased through the community food outlets. However, within the school environment, students are provided with opportunities to consume these foods, as free fruit is given to the students daily, and the school canteen provides meal options that include fruit and vegetables. Cornflakes are also available through the school breakfast program. Although not quantified, it appears that for some households, fish may contribute significantly to dietary intake.

Yolngu foods

The most frequently consumed Yolngu foods were fish, oysters, wallaby, cockles, mangrove worms, munydjutj [green plum], mudcrab and yams. These foods are all available on the island and are the main foods I observed being collected on hunting trips. Of interest is that 7 of the 26 students reported to consume all of the Yolngu foods lots of times, including Yolngu foods that are only available on the mainland. These same students however, showed variation in their reporting of frequency of consumption of store foods, indicating comprehension of the task.
Food security

There were anomalies in responses to the two questions about food security. Nearly half (46%) of the students reported always getting enough to eat; 42% reported sometimes not getting enough to eat; and 12% (3/24) reported often not getting enough to eat. Forty-four percent (11/25) of the students answered positively to the question: do you ever go hungry for a day? However only one of the three students who reported to often not get enough to eat, answered positively to the question on hunger. In contrast, five of the eleven students who reported to always get enough to eat, answered positively to the question on hunger. With such anomalies and such a small sample size, no clear interpretation can be made from these two questions, except that the high percentage of students responding positively to the question on hunger may suggest food insecurity associated with hunger that requires further investigation. Conversely it may indicate ambiguities with the question. The meanings and consequences of food insecurity need to be explored in this context in order to elicit meaningful responses.

8.4.4. Focus groups

Relationship between food and health

Perceptions of body size

On observing each of the vignettes, students immediately sought information from the facilitator on the relationship between characters portrayed in the vignettes. Discussion also centered on the Yolngu foods depicted in the vignette. When prompted by the facilitator to focus on the body shape of the characters, the students immediately differentiated between the overweight person and the thinner person saying “one is fat, one is tall and skinny”. “Liking fatty food” (djukurr’mir ngatha; oil ngatha), “eating bullocky everyday”, “take-away food”, “sugar drink” and “eating lots of food” were associated with becoming overweight. One student made the
comment: “If they eat fatty food, then that fatty food makes them go big”. Students considered an overweight body size to be the “wrong shape”. Becoming overweight was a feature that the students associated with middle age. Being overweight did not seem to carry the same stigma as it does in wider society as students comfortably referred to each of the characters in the picture by their body size, saying “fat one” and “skinny one”.

“Exercising” and “running everyday”, “hunting” and “eating all the good food groups” were identified as important behaviours to prevent overweight or to lose weight. Getting sick and other diseases such as, heart attack, cancer, blood pressure and diabetes were associated with being overweight. Students did not express a desire to be fat, but wished to stay thin and “look after their body”. The word “barka”, meaning skinny, was used in reference to the character in the picture whom was lean and had a body shape similar to many Yolngu adults in the community. This character was perceived by the students as “eating the right food” and “caring for his body”.

Yolngu and store foods other than take-away food and junk food were referred to as “right ngatha” by the students. Take-away food was also referred to as chilinirr ngatha [food with chilli]. Foods both high in fat and/or sugar were described as both junk food and take-away food. Fat in relation to food and health was talked about more than sugar in relation to food and health. Take-away food was talked about in association with “feeling tired” and “getting sick later on”, whereas Yolngu foods, being physically active, and going hunting, were talked about in association with “feeling better”.

**Food security**

*Start talking: “When you are hungry, you start talking”.*

Yolngu learn from when they are small children to express their desires and demand food⁴⁵⁰. Although there is a fortnightly cycle of feast and famine for individuals or households that coincides with the pay cycle (Chapter 7), food insecurity, where food
was not available to young people within the household where they resided, did not seem a concern for young people. It is acceptable for children to move between related households and acquire food. Referring to vignette no. 2, students immediately recognised the boy to be “sick and tired”. However it was assumed that the boy with the spear was a good hunter and that the sick boy would therefore get some Yolngu food to make him feel better. One student commented that the “sick and tired” boy is asking “him to come so they can have food together, because the other one is a good hunter”.

There was an expectation among the students that there would not be any food in the house on returning from school, as shown in vignette no. 5, where the central character depicted, is seeking food and finds the box empty. However, in reference to vignette no. 4, where the person in the vignette is waking up, students indicated that there would be breakfast foods available in the house such as Weetbix or Uncle Tobys. The situation of no food in the house did not seem to be a concern for students as other appropriate options for accessing food were available to them. In the situation where the facilitator indicated that there was no food, the students quickly responded that they could either “go hunting,” “go to school” or “start talking” [to family for money]. Although students viewed hunting as a feasible option to secure food, the most likely option considered by students was to ask family for money and then go to the take-away to get “junk food” or the “right food”.

**Food patterns**

In Chapter 7, the Yolngu dietary pattern of consuming murnyany foods, such as yams, damper and fruit, to balance the consumption of matha’yal foods or animal foods was described. In line with this dietary behaviour, students commented that the characters in vignette no. 3, (which depicted a family sharing shellfish on the beach with a fire in the middle), would be wanting damper and tea after eating shellfish.
Yolngu foods

Students through the individual activities and focus groups emphasized the importance of Yolngu foods through indicating a strong desire to eat Yolngu foods; considering Yolngu foods when there was no other food or money available; and in referring to the health promoting attributes associated with Yolngu foods such as making you feel better when you’re feeling tired and sick. When initially testing the face validity and cultural appropriateness with a group of people in the wider community, negative inferences were repeatedly made about the behaviour of the young persons represented in the vignettes. For example, in reference to vignette no. 3 where the young person is with family cooking shellfish on the fire, it was implied that the young person was thinking about Galiwin’ku town (“the mission”) and take-away food and was not interested in the Yolngu food that was being shared. The boy without the spear in vignette no. 2 was immediately characterized as a town boy [mission boy] who smoked ganja [marijuana]. They contrasted his demeanour with the other boy holding the spear who was illuminated as a good “hunter”.

These inferences made by people in the wider community, were only shared by one of the participants in the four focus groups. This participant differed to the other students as she was a young mother (with baby in hand). Her attention in relation to the vignettes focused on broader issues contributing to nutrition and poor health of people in the community. Echoing the comments of the people in the wider community, this young woman perceived the young boy in vignette no. 2 to be a “lazy boy, petrol sniffer, smoking and ganga”. In reference to vignette no. 3 she suggested that the young boy wanted to be at the “mission” and did not know how to get maypal [shellfish]. Other members of her focus group then agreed with her comment that the boy in vignette no. 3 wasn’t interested in sharing: “he doesn’t want the right food, he wants junk food….take-away food, eating”. They stated that he would later get sick.
8.5. Discussion

The qualitative and quantitative data presented here indicate a strong cultural identity and emotional connection by young people with Yolngu foods. In all the activities presented to the students, Yolngu foods were consistently selected as preferred and healthy foods. This strong attachment to Yolngu foods was particularly demonstrated by the seven students whom indicated frequent consumption of all Yolngu foods, including those foods not available on the island. Wein\(^{440}\) also found in a study among Indian and Metis people of the Wood Buffalo National Park area of Canada that although store bought food was widely used, 7 of the 10 best liked foods were traditional native foods. In a later study among the Inuvialuit, Wein\(^{118}\) reported that children liked most traditional foods as much as the adults. A study among the Cherokee youth and James Bay Indians reported however, that traditional foods were not well liked or valued by young people\(^{200}\). The findings of the present study contradict the perceptions of older people in the community, that young people choose store foods in preference to traditional foods.

There are inconsistencies between foods identified as preferred foods and the foods community people observed young people to commonly buy and consume. The reason for these inconsistencies could be two-fold. Either young people prefer Yolngu foods and more nutritious type foods, but do not consume them for reasons discussed in Chapter 7, or the desire for social approval motivated students responses. Senior\(^{411}\) (p 153) noted among Aboriginal people of Ngukurr community, a strong moral imperative in relation to the use of bush medicines as these represented the “good” old ways. Similarly, there may be strong cultural pressures for young people to select Yolngu foods as preferred foods. Applying this assumption to the present study, it would be expected that the healthy store bought foods and Yolngu foods would be selected as preferred foods.

Responding to a food picture rather than real food reflects an attitude towards the food\(^{451}\). People’s responses may therefore differ if presented with the real food. Whether the student’s responses would differ if presented with actual foods rather than pictures of foods was not tested by this study. However despite the potential for biased responding, triangulation\(^{242}\) (p 556) of the different activities clearly showed
that Yolngu foods were highly valued by young people and students connected with these foods in a cultural way that went beyond taste. These findings illustrate the value of traditional foods to young people in Galiwin’ku, not merely as sources of nutrients, but as an important means of identifying with their culture as discussed in the previous chapter. That young people are “losing the taste for Yolngu foods” cannot be blamed on young people but on wider societal shifts.

This study also shows that students in general are able to make knowledgeable choices about food. Students clearly identified the foods not commonly recommended for good health and generally understood the present and future implications of poor eating habits. The uncertainty of students in classifying core foods besides fruit and vegetables such as rice, eggs, and milk, indicates that while nutrition education has successfully conveyed messages regarding the health consequences of consuming foods high in fat and/or sugar, its promotion of core foods has been less consistent and has had less impact. Milk for example may not be considered healthy by nutrition educators unless reduced fat milk; rice may not be considered healthy unless brown rice; and messages about cholesterol in eggs have tarnished their health record. It is difficult to consider the health properties of individual foods in isolation of the total diet. As shown in the previous chapter, people consider the overall dietary pattern, rather than individual foods per se in relation to health. The consequence of nutrition education in focusing on foods to avoid, rather than promoting and providing clear messages on foods to enjoy, is that people know the “taboo” foods, but have received inconsistent messages regarding other foods to eat besides fruit and vegetables. Fruits are clearly a favourite food across different age groups in the community.

Similar to the findings of a study conducted among adolescent females in Toronto\textsuperscript{452}, the students dichotomised foods into two groups: “junk foods” and “right foods”. The terms “junk foods” and “take-away foods” were used interchangeably in the present study. The taste and pleasure attributes of “junk foods/take away foods” described in terms of sweetness, saltiness, colour and temperature, were important determinants for liking them. Taste, convenience and affordability have repeatedly been shown by researchers to be important determinants of eating “junk food” among adolescents\textsuperscript{125,452-454}.  

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The students stated that “junk food” contained a lot of fat and/or sugar that could cause dental disease, lead to overweight and obesity, general malaise and other chronic diseases. Students were aware that present dietary patterns could affect future health. While students described the health consequences associated with eating less healthy foods in relation to both present and future sickness, the health consequences associated with eating healthy foods were mostly expressed in relation to present physical and emotional status. In the Toronto study, female adolescents aged 11 to 18, although aware of the health attributes of food, did not rank health in the long term, high enough to influence present eating behaviour. However, Contento found among students aged 11 to 18 in schools in New York, that at one end of the spectrum are persons whose motivations are highly hedonistic, where taste and social environmental factors are the most important influences on food choices, while at the other end of the spectrum are persons for whom food choices are also importantly motivated by the health consequences of the choices. The focus on the present consequences of eating rather than the distant future was also reported by Neumark-Sztainer et al who suggested that programs to improve young peoples’ dietary intake, may need to focus on health-related issues of relevance to young people, and the functions of eating besides health such as the social aspects, and in the present context the cultural aspects, rather than health issues in the distant future.

In addition to Yolngu foods, fresh fruits were consistently selected as preferred foods by students. Taste, sensory appeal and health attributes were given as reasons for liking fruits. Vegetables were not selected by the students as a preferred food. While young people reported liking fruit and vegetables, Chapter 5 and Chapter 7 have demonstrated that accessing these products may be problematic.

Food preferences do not predict food consumption. Although young people expressed a preference for traditional foods and fresh fruits, there are many intervening variables that determine actual food consumption. Wein and Freeman, among an Inuvialuit population in Canada reported a weak association between preference and frequency of use. Food preferences are learned through the frequency of exposure and the contexts and consequences of eating. Parental and social environment influences have been shown to be important influences on fruit
and vegetable consumption, and social environment and peer influence important factors associated with the intake of “take-away” foods. The previous chapter also indicated the importance of the social learning environment on food choice. In Galiwin’ku community, the school plays an exceptionally important role in fostering healthier diets, by providing opportunities for young people to try different foods and making available a range of appealing, healthy food options through the school canteen. The breakfast program and healthy snack program, where fresh fruit is given to the students on a daily basis, model and help to establish good eating habits for later life, in addition to providing a secure food base for young people in an environment where accessing food can be insecure.

Despite young people’s broad awareness of nutrition recommendations, young people have not adopted behaviours promoted by these messages. This is not surprising, given that knowledge has only been shown to be weakly associated with food choice. A study among primary school aged children and their parents in Victoria (Australia), showed that high levels of knowledge about healthy foods, did not generally translate into reports of consistently healthy behaviours. In the Victorian study, children showed an understanding of the health value of foods and could identify the healthy and unhealthy foods pictured, but showed a preference for the less healthy foods. Taste, hunger, food cravings, appeal of food, convenience and cost have been shown to be more important to adolescents in food selection than eating healthfully. Findings in the previous chapter also support these determinants of food choice in the wider community. When hungry the adolescents in the study by Neumark-Sztainer et al said they wanted something fast and something that would fill them up for a while. Take-away food was appealing as it was considered inexpensive, tasty, and filling, and available at less cost than more healthy food options.

Birch has also shown that children learn to prefer flavours associated with energy dense foods, especially when hungry. The energy cost of high fat and/or sugar take-away foods in Galiwin’ku community, coupled with food insecurity, make take-away food an attractive food source. In the present study, woven through the young people’s discourse of “right ngatha” and the chant of “going hunting” was the desire for “take-away” food. People in the wider community spoke of having cravings for
“junk food” and feeling addicted to it. Throughout peoples’ discourse in the wider community, take-away food was associated with defiance and a loss of respect for traditional food. In Galiwin’ku and in wider society, take-away food has come to represent a break away from traditional food behaviour. The Toronto study by Chapman and Maclean\(^{452}\) showed that adolescents associated take-away food with weight gain, pleasure, friends, independence and guilt and the consumption of healthy food with weight loss, parents and being at home. According to Chapman, the conflict the young women in her study felt between whether to eat junk food or healthy food symbolised the conflict young people feel between maintaining family relationships and gaining autonomy as an adult. The situation at Galiwin’ku however is that young people often do not have the choice to eat the “right food” or “junk food”. In an environment where young people are encouraged to be autonomous at a young age, and where high fat/high sugar take-away foods and drinks are readily available and food preparation in the home is problematic, it is not surprising that take-away food is frequently consumed.

Programs to improve the dietary intake of young people therefore need to consider the many spheres of influence on young people’s food choices: food outlets, school environment, families, peers and young people themselves. Based on the available evidence to encourage healthy food selections by young people, healthy foods need to be presented in an appealing way; be tasty; be competitive in cost to less healthy options; be convenient and filling; and offer repeated opportunities for young people to try them.

This study also revealed the challenge in conducting research in a cross cultural context. Considering my age, there were not as many opportunities for me to engage with young people in the community as there were with older aged people. The school therefore provided an opportunity to explore the views and understanding of young people congregated in the one setting with the assistance of teachers who had established relationships with the students. The compromise was that the views of non-school attenders were not represented.

The small sample size and time restriction did not allow for the testing of traditional measures of reliability and validity. In the absence of culturally sensitive measures
and methods to understand food preferences, food knowledge, and frequency of food consumption of young Aboriginal Australians in the study population and similar communities in Australia, the measures developed and trialled in this study contribute to this gap in knowledge.

The activities that required an open ended response such as the drawing activity and the focus groups resulted in fewer ambiguities in student’s responses than the more structured questions. For example, while a number of students freely drew “junk foods” as foods they liked and were not good for them; few students selected the pictures of “junk foods” as preferred foods. Furthermore, in the food frequency questionnaire, every type of fruit and vegetable including dried fruit, tinned fruit, salad vegetables and cooked vegetables were reported as frequently consumed foods, whereas “junk foods” were less likely to be reported as frequently consumed foods. Although students do receive fruit on a daily basis through the school healthy snack program, community level dietary data indicate that fruit and vegetables are not regularly consumed.

In spite of these ambiguities, the strength of this study was that the combination of different activities allowed for triangulation of the data and juxtaposing of results from one activity against the other. The aim was not to describe young people’s dietary intake, but to explore food preferences and knowledge in relation to food and health. The pattern of responses across all the activities clearly revealed student’s ability to differentiate between healthy and less healthy foods and demonstrated student’s preference for Yolngu foods and fresh fruit.

As previously stated, the concept of food security has not been explored in this context previously. Inconsistencies in the students’ responses prevent conclusions being drawn from this study regarding food insecurity with or without hunger. Exploratory work is needed to characterise food insecurity among this population group, and to inform the development of a tool to reliably assess its magnitude and impact on health and psycho-social well-being.

The results presented here have important implications for health promotion. The principal findings demonstrate that young people are knowledgeable about food and
health and that factors other than knowledge determine food choice. Nutrition initiatives that focus on improving taste, attractiveness, affordability and convenience, rather than just focusing on the provision of information need to be supported. In addition, young people strongly identify with Yolngu foods. Opportunities for young people to participate in the collection, preparation, conservation and consumption of Yolngu foods are critical to ensure nutritional, physical, psycho-social and cultural well-being.
Phase 4: Administration and policy assessment
In the past Yolngu people did sell and exported fish and sea marines collected and caught along rivers and in Coral reefs. The NT Fisheries Department soon came and stopped Yolngu from selling and exporting sea marines. Boats were burnt down. They stopped Yolngu to do the work they were doing. This made Yolngu sad. Therefore they resigned. The NT Fisheries Department authorised Yolngu fishermen to use Dikarr [name of vessel] which was bought at Brisbane. When they saw this happen they left the work and no interest were seen for Yolngu to develop a business.

In the olden days boats were named and every clan used to go out fishing. This process gave these Yolngu fishermen interest and they were committed to the work they were doing. The Fishermen were selected and grouped into clan groups. They were happy and very much motivated. Soon the NT Department of Fisheries was involved and the boats were burnt down; this made the worker sad because all the boats were named Wetitj (Galpu), Djer’parri (Liyagawmirr), Djarrak’ (Djambarrpuyngu), Gurrumgurrum (Gumatj), Dhurrpinda (Gupapuyngu). When these boats were there it gave life and interest for fishermen and their families.

The NT Fisheries authorised to use one boat. The boats name was Dikarr: Yolngu Fishermen started to stop work, soon the boat was wrecked.

This is just an old story. This means we need to revisit that process and the work (start again). I attend the meeting which is held by NT Fisheries Department and our last meeting was at Malarramirr. I am trying to raise an issue for Yolngu business on Marine Life, an issue that was important for us for collecting food source from sea and to build healthy Life living for Yolngu. Yolngu has to sell and develop own business here as local, such as fish, barramundi, mudcrabs and any other food source that Yolngu ate and liked (Oscar Datjarranga speaking, 2005).
Chapter 9. Partnerships and collaboration

The introductory quote to this chapter highlights the importance of relationships between Yolngu and governing organisations in determining work structures and thereby affecting productivity and work satisfaction. It also refers to the futility of a “top down” approach. This “old story” about the demise of a once productive fishing industry in Galiwin’ku community demonstrates the consequences of imposing a western work structure that disregards relationships and purports to focus entirely on productivity and efficiency and yet has the opposite effect. Through examining the community store over four years, this chapter explores the factors influencing the nutritional quality of the store food supply. This chapter provides the final administrative and policy assessment phase, of the PRECEDE-PROCEED model and proposes a framework for applying the PROCEED part of the model in the community store setting.

9.1. Introduction

The previous sections of this thesis have demonstrated important historical, social, cultural and economic factors influencing food choices. At an individual level, people indicated that they favoured fresh, natural foods, and clearly differentiated between health promoting and less desirable foods. Availability of nutritious foods through the community store has been previously reported to be a key factor hindering access to healthy food and challenging nutrition improvement\textsuperscript{51,129}. In turn there are a number of factors that determine the availability of good quality foods. Store managers, for example, have been shown to positively influence the nutritional quality of the store food supply\textsuperscript{127} by either ensuring the availability of nutritious foods, such as fresh fruit and vegetables, wholemeal bread and sandwiches, or by supporting store-based strategies to influence purchasing behaviour\textsuperscript{143}. Other factors described in Chapter 2, Section 2.6.1 and summarised in Table 2.1, that affect the availability of good quality foods through the store are: consumer demand\textsuperscript{126,142}, store management and efficient operations\textsuperscript{126,142,157}, in-store marketing and consumer
education, adequate infrastructure and carrying capacity, and adequate and reliable transportation of produce.

Lee and Bailey were the first to demonstrate improvements in the nutritional quality of the store food supply through intervention. The intervention described by Lee et al. was two pronged. It involved modifying the availability of recommended foods, such as introducing fresh salad sandwiches into the take-away and ensuring an adequate and reliable daily supply of fresh fruit and vegetables and wholemeal bread, together with point of sale consumer education using “shelf talkers”, and community-wide education. Remote community stores have since become the focal target for nutrition intervention. Scrimgeour et al. showed that the purchasing behaviour of young children could be modified through increasing the provision, promotion and marketing of “healthy foods”. For example, one such strategy, to encourage young people to purchase fruit rather than a cold sweetened drink, was to place a bowl of fruit at the store counter near where children were playing game machines.

Improvements in the availability of fresh fruit and vegetables, fresh sandwiches and leaner cuts of meat have also been shown to occur as a result of a “whole-of-store” approach to improving food quality through better business practices, including employment and training, and applying stock management procedures. Increases in fresh fruit and vegetable turnover have been shown to occur with instalment of appropriate refrigerated storage and display bins. Lee et al. and Goto have demonstrated shifts in the nutritional quality of the store food supply in the absence of externally driven intervention and community-wide education. Where improvements in relation to availability, quality and affordability have been shown to occur without external intervention, it is largely through store managers addressing the various components of the store’s operating system to improve store practices. Initiatives undertaken independently by store managers to improve the nutritional quality of the food supply largely go unreported and yet impact significantly on the nutritional quality of the store food supply.

The interventions described show that favourable outcomes in relation to the nutritional quality of the store food supply can be achieved with and without...
externally facilitated and/or community-wide education. However, there is little documentation of the facilitators and barriers related to positive and negative nutritional changes in the store food supply.

In an effort to reduce the risk of diabetes and related conditions, the study community was particularly focused on improving the nutritional quality of the food supply available through the community food outlets. This research phase therefore focused on the community store as it was shown in Chapter 5, Section 5.5.1 to be the largest supplier of food for the community and as previous research had indicated the store as a critical intervention setting for nutrition improvement. As part of the PRECEDE assessment, the aim of this research phase was to identify the issues that would need to be addressed for guiding intervention to advance and sustain improvements in the nutritional quality of the food supply.

The purpose of this study was to gain insight into the process of change as being undertaken by an organisation aware of the challenges to improving the nutritional quality of the food supply and committed to improving the health and nutrition of Aboriginal people.

9.2. Aim

Using the Galiwin’ku ALPA store as a case study, the broad aim of this chapter is to provide insight into the key “environmental” and “relational” factors related to improving the nutritional quality of the store food supply, and to propose an approach based on this learning to support change for nutrition improvement.

Specific aims:
To identify and understand the facilitators, barriers and challenges to improving the nutritional quality of the store food supply in the following three areas: 1) fruit and vegetables, 2) confectionery and 3) take-away food.

To consider an appropriate approach to support change for improving the nutritional quality of the store food supply.
9.3. Method

9.3.1. Study design

A case study\textsuperscript{399} of the store was constructed using multiple sources of data from field work including: 1) historical data gathered through reviewing archived documents pertaining to the early development of ALPA in the 1970s and early 1980s; 2) observations of the store over a four year period from 2001 to 2005; 3) participant observation over a two week period of helping in the store and take-away; 4) unstructured interviews\textsuperscript{403} with store managers, store employees and community members; 5) ongoing communication with ALPA management; 6) meetings with ALPA management; and, 7) participant observation of community meetings and workshops relating to the store and/or community nutrition improvement. Data relating to fruit and vegetables, confectionery and take-away food were collected, as store attention was focused on these areas.

A single case descriptive study design was used to explore and describe the barriers and facilitators related to changes in the nutritional quality of the food supply in the study community\textsuperscript{403}. The nutritional quality of the food supply was assessed using the turnover of fruit and vegetables and the quantity and quality of the fruits and vegetables displayed; 2) the turnover of confectionery and marketing strategies; and, 3) the number of healthy take-away options available for sale.

9.3.2. Data collection

Historical data and documentation

Records pertaining to ALPA in the Uniting Church of Australia series with the NT Archives Service were reviewed. Data relevant to the development of the ALPA Galiwin’ku store for the period 1974 to 1980, were extracted and photocopied or entered directly into a word document.
Documentary information included letters, minutes of meetings, email communiqué, reports, field notes and an evaluation of the ALPA enterprise conducted in 1993 by Young. Data extracted from letters, minutes of meetings and email communiqué were compared and corroborated with other evidence collected through interviews and observation.

**Participant and direct observation**

A two week period was organized with ALPA to observe store operations. In this role I participated in preparing food in the take-away, organising the chiller and restacking the cold drinks chiller. This provided opportunity to develop a relationship with staff and to perceive reality from the viewpoint of someone “inside” the case study rather than external to it. Three days were also organized with the take-away proprietor to observe take-away practices and converse with staff.

Direct observation of the store was made on every field trip to the study community over the period of the research. This involved regular visits to the store. Observations made related to: the display, quality and variety of fresh fruit and vegetables, the display and marketing of confectionery and the availability of healthy food choices in the take-away. General store ambience was also noted.

Data was also collected through participant observation of community meetings, meetings with ALPA and community workshops as described in Chapter 7, Section 7.3.2.

**Interviews**

Two types of interview methods were used to collect data: guided conversations and focused interviews. Guided conversations occurred with store employees, store management, ALPA management, employees of the private take-away proprietor and store customers. The purpose of these conversations was to examine people’s insights and opinions on events and practices observed. Focused interviews were conducted with the three store managers employed with the study community store during the period February 2004 to December 2005, an Aboriginal employee of
ALPA, an independent wholesaler, the private take-away proprietor, a private take-away employee and a store manager with 13 years of store management experience external to the ALPA enterprise. This manager was purposely selected based on his management experience of a remote community store and his involvement with a store initiative to increase the turnover of fruit and vegetables.

The length of interviews ranged from 20 minutes to 2 hours. Five of the eight focused interviews were recorded and transcribed. These interviews were open-ended in nature and initially served the purpose of identifying key factors perceived as either facilitating or hindering the process of improving the nutritional quality of the food supply in remote communities. Participant observation together with unstructured interviews served to corroborate and test emerging themes.

9.3.3. Analysis

Data analysis was guided by inductive and deductive coding. Deductive coding was informed by existing concepts identified as important to the nutritional quality of the food supply: store management; store operations; in-store marketing and consumer education; infrastructure; employment and training. Inductive coding was used to identify key concepts and ideas emerging from the data that related to the nutritional quality of the food supply.

First, the multiple sources of data were organized chronologically in a table. The chronology depicted the key events that occurred within the store over the study period that related to nutritional quality in the following three areas: 1) fruit and vegetables, 2) confectionery, 3) take-away food. Although the period of time for the case study spanned over 2001 to 2005, particular attention was given to the 12 month period, February 2004 to December 2005. This period coincided with an increase in effort by ALPA to increase fruit and vegetable turnover. Next, the turnover measure developed from Chapter 10 was used to determine the impact of the key event on the nutritional quality of the food supply. Finally, text segments from interviews, field notes and observation data were compared and contrasted to identify barriers, facilitators and challenges in relation to positive and negative changes in the
nutritional quality of the food supply. Through an iterative process of coding, five higher-order themes emerged. Each theme was associated with a set of barriers, facilitators and challenges.

The multiple sources of data described provided the means to cross validate the emergent constructs. This method of triangulation was used to strengthen reliability of the data and internal validity. Member-checking was also used to check the accuracy of the findings. This was done by providing a copy of the draft case record to the ALPA nutrition manager and a colleague, MS who was also involved in community-wide activities to support healthy eating, and incorporating their comments into the final edit. Member-checking also occurred throughout the study through engaging in conversations with store managers and community members and discussing emerging themes.

9.4. Findings

This was a long term study and during the period of the study ALPA actively worked and continues to work at improving the nutritional quality of the community food supply. Since the period of this study ALPA have employed a nutritionist and have invested in implementing a nutrition and health strategy across their member and consultant stores. The structural issues presented in this chapter that enabled and/or hindered improvements in the nutritional quality of the food supply are not confined to the store under study or to ALPA. They are commonly experienced by many remote community stores. Indeed ALPA is widely regarded nationally as a leader in addressing the barriers and challenges to improving the nutritional quality of the food supply available to people in remote communities. In granting permission for this study, ALPA has provided the opportunity to gain insight into the complexity of challenges that remote community stores face. These challenges partly relate to the unique responsibility and difficult task of remote community stores to ensure the availability of a nutritious food supply for community members.

Five key themes emerged from the analysis. The themes are summarised in Table 9.1 and reflect features of the store’s operating system. Each theme was associated
with a set of barriers, facilitators and challenges to the implementation of practices that improved the nutritional quality of the store’s food supply (“good practices”). The identified themes account for the variation in observed changes (positive and negative) in the quality of the food supply over the four-year study period. These changes are discussed in Chapter 10, Section 10.5.3 (p 334).

In summary between 2001 and 2004 fresh fruit turnover increased by 51% and then fell close to the 2001 level in 2005. Between 2001 and 2005, vegetable turnover increased by 81%. This change in vegetable turnover was most marked between 2004 and 2005. Confectionery turnover increased by 89% between 2001 and 2004, with no further increase in turnover observed between 2004 and 2005. While confectionery turnover increased, there was a concomitant reduction by 26% in the turnover of sugar between 2001 and 2004. The turnover of sugar however returned to approximate the 2001 level in 2005. The number of healthy food choices available through the take-away remained variable throughout the study period.

Each of the five themes identified, is discussed in detail in the following section. Quotes are used to substantiate the themes. To protect the identity of individuals, we have placed generic identifiers on the quotations.

Table 9.1 Summary of findings pertaining to factors influencing the nutritional quality of the store food supply
<table>
<thead>
<tr>
<th>Factors facilitating good practice</th>
<th>Barriers to good practice</th>
<th>Challenges</th>
</tr>
</thead>
</table>
| **Leadership:**  
Power of store manager | Competent management | Inexperienced management | Attracting competent management staff |
<p>| | A supportive environment for store management | High turnover of management staff | Maintaining consistency with high turnover of management staff |
| <strong>Negotiating a partnership between profit and health</strong> | Practicing benevolent choice rather than exploitive choice | Tension arising from need to generate profit from “unhealthy” food categories such as confectionery, higher-fat pre-prepared foods and added sugar drinks to cross-subsidise “healthy” food categories such as fruit and vegetables | Providing choice in a challenging environment where competition is limited and where food choices are largely determined by economic and social factors |
| | Profits invested in improving infrastructure and nutrition and health promotion | Negative perception of some non-Aboriginal management staff on Aboriginal people’s food preferences | Maintaining profits to invest in capital improvements |
| | Responding to community people’s requests for fresh and tasty food | Dispelling prejudices concerning Aboriginal food preferences |
| <strong>Adequate infrastructure</strong> | Investing in adequate storage and refrigeration space and food preparation equipment | Inadequate investment in storage space, refrigeration and food preparation equipment due to insufficient funds | Investing in improved infrastructure while maintaining affordable mark ups |
| | Attractive and appropriate display and presentation of fresh produce | Insufficient attention given to the presentation and display of fresh produce | Attractively presenting fresh produce while minimising spoilage factor |
| <strong>Appropriate training and workforce development</strong> | Training and workforce development considered a priority | Demands on take-away contributing to inadequate time for workforce development, employee absenteeism | Maintaining emphasis on training and workforce development, reliable workforce |
| | Motivated, skilled and encouraging management staff | Learning process required for new management staff to adjust to and become familiar with policies and procedures | Recruiting and valuing competent staff |
| | Good rapport between trainer and staff to enable appropriate on-the-job training | Ad hoc training delivery of government service providers and training disconnected from workplace | Maintaining ongoing on-the-job training with high management turnover |
| | Staff willingness to share ideas and encourage Aboriginal staff in food preparation | Lack of confidence of Aboriginal staff to prepare and creatively display food | Maintaining level of interest in food preparation with high management turnover |
| | Staff-customer relationships based on respect | | Nurturing an environment of respect |</p>
<table>
<thead>
<tr>
<th>Role of feedback and planning</th>
<th>Factors facilitating good practice</th>
<th>Barriers to good practice</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appropriate feedback on performance in relation to nutritional goals</td>
<td>No system in place to monitor and feedback on nutritional goals</td>
<td>Developing and implementing a user-friendly feedback and planning system</td>
</tr>
<tr>
<td></td>
<td>Mechanism for community input into planning and decision-making</td>
<td>Unsubstantiated criticism of store nutritional practices based on subjective impressions and prejudices</td>
<td>Providing a mechanism that is culturally safe for community people to influence store decision-making and to enable constructive feedback</td>
</tr>
<tr>
<td></td>
<td>Unsubstantiated criticism of store nutritional practices based on subjective impressions and prejudices</td>
<td>Feeling of disempowerment by community members to influence nutritional quality of the food supply</td>
<td>Establishing a systematic and participatory approach to planning, monitoring and evaluation</td>
</tr>
<tr>
<td></td>
<td>Ad hoc delivery of nutrition intervention by government service providers and other health professionals</td>
<td>Tension between nutrition education and organisational change</td>
<td>Viewing good nutrition as an outcome of organisational change and good store practice rather than a stand alone objective</td>
</tr>
</tbody>
</table>
9.4.1. Leadership: Power of the store manager

“To really get across to [store] managers that they have the power to decide what people eat and what they don’t eat” (Interviewee, 2005)

As shown by Lee et al\textsuperscript{127} ten years previously, store managers are in a position to either positively or negatively influence the quality of the food supply. In the present study context where the store manager was supported by an organisation management team, it became evident over the four years that I observed and documented events in relation to the store that the store manager was critical in maintaining either good or poor store nutritional practices. The management team also played a key role in facilitating change for nutrition improvement and creating a supportive environment for the store manager to maintain improvements in the nutritional quality of the food supply.

In the period of these observations, three store managers and several relief managers managed the store at Galiwin’ku. Each store manager arrived with a different level of retail experience and a different management style.

The store manager from July 2000 to May 2002 had previously managed another ALPA store. This store manager was keen to increase the turnover of fruit and vegetables, source a meat supplier who would provide lean meat cuts and extend the number of food lines in general. In 2001, the government nutritionist together with the community health centre health promotion officer organized a workshop for take-away managers and staff to encourage the preparation of lower fat take-away alternatives to pies, hot chips and roasted chicken. An outcome of this workshop was an agreement between the ALPA store manager and the private take-away proprietor to not sell fried take-away food on Fridays of each week, termed “No Fry Fridays”. Apparent non-compliance with this agreement by both the store and the take-away and a noticeable increase in the number of confectionery lines in the store, prompted the government nutritionist in collaboration with the health centre to formally complain to ALPA. It is important to note that since this time ALPA have ceased preparing deep fried foods. In the following year, a number of new players,
including the MSHR research team and an independent wholesaler, worked at forming a relationship with ALPA, at both the store and organisation level.

Results of the 2001/2002 community-wide screening and store-turnover highlighted an inadequate intake of fruit and vegetables at the community level as shown in Chapter 4 and Chapter 5. A chain of attempts to rectify the situation unfolded, that involved people working independently “to fix the problem”. At the community level, encouraging and supporting back-yard fruit and vegetable gardens, was considered to be one approach to the low intake of fruit and vegetables. Improving the cold chain was considered another solution by ALPA management and the independent wholesaler:

The cold chain was probably the most important thing that we identified. Their [the clients] biggest problem [was] that it was more the wastage of fresh produce and what it looked like once it got there…so there was always a blaming attitude between wholesalers and their clients on remote communities….there was always that slack attitude also from wholesalers that they could get away with sending fresh produce to communities knowing that it would never arrive perfect, so therefore they sometimes, I suppose, could fall into the area of maybe sending not quite good produce out to the communities as well (Interviewee, 2005).

Provisioning remote community stores with fresh produce had always posed a challenge for ALPA. In the 1970s freight to Galiwin’ku was irregular with waits of over one to two months between deliveries. Freight was costly and refrigeration units were required before fresh produce could be carried. Early in the history of ALPA, are records of initiatives by individual store managers to provision the store with fresh fruit and vegetables at an affordable price. For example, in 1978, weekly air-freighted supplies of fresh fruit and vegetables were organized and sold at cost price in the Galiwin’ku store. There is evidence that fresh produce was not regularly available through some ALPA stores until the early 1980s. In the early 1990s, in an effort to encourage consumption of fruit and vegetables, ALPA introduced a 100% freight subsidy on fresh fruit and vegetables which currently applies, as evident from data presented in Chapter 5, Section 5.5.8.
During the present study period, the first noticeable change in relation to fresh fruit and vegetables in the store coincided with the conversion from the cash register to electronic point of sale scanning. With the ability to weigh individual items of fruit and vegetable at the counter, ALPA introduced a pick and pay system where the customer could select the quantity of fruit and vegetable desired rather than selecting pre-packaged quantities only. ALPA then explored ways of improving the display of fresh fruit and vegetables in the store in collaboration with the independent wholesaler. Unique to the approach of the independent wholesaler was the endeavour to understand the situation of store managers and find solutions collaboratively, rather than condemn and blame store managers for their alleged lack of concern. Managers of stores in remote Aboriginal communities across Australia have traditionally been held accountable for the nutritional status of the community and accused of exploiting Aboriginal people. As one store manager expressed: “when talking about the reputation of store managers…. [we are] all lumped together, some of us are trying to do the right thing” (Interviewee, 2005).

Certainly a lot more pressure is placed on them [store managers/owners]. It’s deemed to be that they control the health of those communities. It’s simply put like that…because the food goes to those stores and because the stores sell the food to the community, it is the one thing that people can visually see as something that they [government officials] think they can change (Interviewee, 2005).

The independent wholesaler had observed that while ALPA for example, and other food outlet managers were having to respond to many different people, ranging from wholesalers to government officials, no one party had attempted to enter a partnership with the concerned businesses, where both parties could benefit through a better understanding of the issues and the negotiating of solutions together. The wholesaler had observed that a cycle of blaming and “reactive responses to keep people happy and maintain the company’s face” were an outcome of relationships based on mistrust and skepticism rather than partnerships.

An outcome of the collaboration with the independent wholesaler and the increasing pressure to increase the turnover of fresh fruit and vegetables was the trialing of market days in February 2003, where produce in season was marketed once weekly.
at the front of the store in bins. Due to too much spoilage, this idea was not developed further until the store was air-conditioned in 2004. Until this time, no further improvements were observed in the marketing of fresh fruit and vegetables. A new store manager was appointed in May 2002. This store manager had retail experience but no prior store management experience.

The contribution that ALPA was making to the health and well-being of the community was perceived by this store manager in terms of extended store and takeaway opening hours, commitment to developing ALPA like a “proper supermarket” with discounts, providing a wide range of options through continually expanding the number of product lines, and being responsive to consumer requests as well as requests from health professionals (Field notes, 2004). Over a two week period of observing the store in February 2004, it was evident that little attention was given by this store manager to ensuring an adequate supply of fresh fruit and vegetables. Other essentials such as bread were also allowed to deplete. These observations were supported by comments from community people regarding the lack of fresh fruit and vegetables particularly on the days prior to the barge arriving and the perceived disorganization of the store manager (Field notes, 2004).

Invariably limited fresh fruit and vegetables were available on a Saturday and stocks not replenished until the Tuesday or Wednesday after the arrival of the barge. The store manager perceived inadequate storage capacity, spoilage, staffing issues and time as the biggest impediments to improving the turnover of fresh produce. Indeed the store manager “liked to run out” as he believed that perishables such as lettuce and celery only lasted a few days. Fruit and vegetables were not restocked on a Saturday. When questioned on this, the store manager stated that produce was held in the chiller if the customer should request it (Field notes, 2004). Based on these observations, an inadequacy in the provision of fresh fruit and vegetables was further brought to the attention of ALPA. These observations were checked against the Northern Territory MBS by the ALPA general manager, who was surprised that ALPA was “average rather than leading NT stores in terms of availability and cost of the Market Basket” (Interviewee, 2005).
Over the ensuing year, a steady increase in the turnover of fresh fruit and vegetables occurred. ALPA aimed to increase fresh fruit and vegetable sales to 7 to 8% of store sales from a current average of 3.2% across all stores. In November 2004, the store manager commented that he had “massively” increased the fruit and vegetable order as ALPA management indicated that “they’re not so worried if we do throw out a bit of fruit and veg”. Air-conditioning was installed in the store in mid 2004 which enabled the original idea of bins of seasonal fruit and vegetable to be pursued. Fresh fruit and vegetables were displayed near the check-out in trolleys in addition to the produce available in the store refrigerators. The turnover of fresh fruit in 2004 reached a peak in the month of December where it was double that of March of the same year (Chapter 10 Figure 10.11, p 335). Despite efforts by ALPA to increase the turnover of fresh fruit and vegetables, the store manager still considered staffing and storage as two main issues preventing further increases:

…”So they [ALPA] are really trying to push the fruit and veg side of it, but I mean, I know every shop it’s the same, it is room. Where do you put it? I have a fridge that holds 3 palettes, no use me ordering in 5 palettes of fruit and veg when I’ve got nowhere to put it” (Interviewee, 2004).

It’s the same thing in there [in the store], it’s room, we only have an 8 door fridge, everything we keep from drinks to eggs to cheeses through to our fruit and veg, so unless they [ALPA management] increased it and said well you got 8 doors for just fruit and veg, you probably could sell it, but what do you do with all the rest of it, rooms a big issue for these shops. You would sell it, you only have to go and look, we’ve got it [the fruit and veg fridge] full, our fruit and veg is crammed in there. I did it, I came in yesterday and I came this morning and it was empty and we filled it up again, it doesn’t look very presentable but you’ve only got so much space to do it. Today is just a classic case, out take-away lady, she’d gone to Darwin, so there’s no-one to do fruit and veg, so we’ve used 2 or 3 different ladies to rip in there and get as much fruit and veg out there as we can, present it as best we can, and sell it. I know they [ALPA] want beautiful looking pictures and nice doors and that, but it’s not reality you know, we have to get it out and sell it as quickly as we can….if we had room we could put it all out at once, and forget about it, but it has to be done hourly basically…they [the customers] do like the fruit and veg you know (Interviewee, 2004).
Display bins arrived in February 2005 and were installed behind the counters as anticipated by the store manager who resigned as store manager in January 2005. A “fix it” relief manager was sent to Galiwin’ku store from February 2005 to April 2005, to overlap with the commencement of a new store manager. By March 2005, the turnover of fresh fruit had increased by 66% from March 2004 (Chapter 10 Figure 10.11, p 335). The turnover in fresh vegetables however had not changed. The increase in the turnover of fresh fruit continued to follow the steadily increasing trend that had commenced the following year, since March 2004. However, as previously noted by a store employee in 2004 when experienced relief managers temporarily managed the store, the impact of the relief manager on the store was more significant than solely maintaining an increase in the turnover of fruit and vegetables. The morale of the store changed with the “fix it” relief manager. In 2004, a store employee had noted:

Two relieving managers managed the store for two weeks, both with long histories of retail and administration experience. During this time of competent governance, the store was clean, stock was orderly, staff attentive and productive. When the store returned to its usual chaotic disarray, absenteeism was high, morale low and essentials depleted (Interviewee, 2004).

During the period of the “fix it” store manager, similar changes were noted. Indeed, for the first time in the period of this study, I noted positive feed-back in relation to the store from a number of people in the community (Field notes, March 2005). New lighting, ceilings and shelving also contributed to the changed store ambience.

The fruit and veg display looks really good as you walk into the store…there are bags of oranges, sweet potatoes, potatoes and pineapples displayed. It was the day before barge day and the display shelves looked full……There were bowls of mixed green leaves and instead of the normal three to four doors dedicated to fruit and veg, there were 6 doors extending into the dairy section. The store felt good (Field notes, 2005).

It was questionable if these changes could be maintained. Being a relief manager, the “fix it” manager moved on with the positioning of a permanent manager. Indeed the turnover of fresh fruit measured for the May, June and July quarter in 2005 was
less than the turnover measured in 2001 (Chapter 10, Table 10.9, p 333). It is likely however that this reduction in fresh fruit turnover was due to bananas not being available for sale after the destruction of a local banana plantation by a cyclone towards the end of March 2005. In contrast to the reduction in turnover of fruit, turnover of fresh vegetables increased markedly by 68%, between the May, June and July quarter in 2004 and 2005 (Chapter 10, Figure 10.12). As noted previously, by 2005, fresh vegetable turnover had increased by 81% from the 2001 level (Chapter 10, Table 10.9, p 333).

Taylor and Westbury\textsuperscript{157} linked improved food quality observed in a store in the Katherine region of the NT to better business practices through taking a “whole-of-store” approach which included employment and training, and developing and implementing stock management procedures. Since March 2004, ALPA had achieved a steady increase in the turnover of fresh fruit and vegetables through firstly making an organisational commitment to increase turnover of fresh fruit and vegetables and secondly through making appropriate infrastructure changes to support an increase in the carrying capacity and display of fresh produce. The store manager throughout 2004, as the change process unfolded, continually felt constrained by staffing issues, inadequate infrastructure, and the tension at an organisational level between profit and health. Poor store governance largely due to management inexperience perpetuated these constraints. In a retail environment that presents challenges unique to that of mainstream, as demonstrated in the following excerpt from a letter to ALPA management, both management experience and a supportive environment emerged as critical to effective store operations:

Over the last two weeks we have had several store closures for ceremonies or because of staff absences without notice. In addition to the property invasions and damage requiring repairs, police and management intervention, [the manager’s] vehicle has been rendered unserviceable, the [assistant manager’s] family has been bereaved necessitating their absence from the community, the barge was delayed several days and low stocks prior to stock take...meant the store was without all the essentials for an extended period...(communiqué, 2004)
The challenge however is recruiting competent management to remote areas and providing them with adequate support to deal effectively with the cross-cultural challenges in addition to the challenges of managing a store in a remote geographical region. Throughout the study period, ALPA was primarily facilitating change through improved policies and procedures at the organisational level and improved infrastructure at the store level. In October 2004, the ALPA board of directors held a strategic planning seminar and resolved that ALPA’s priority would be: to significantly increase ALPA’s contribution to the improvement of health and nutrition in Arnhemland communities, specifically targeting diabetes, kidney disease, heart disease, Aged-Care and children’s health. Following this, ALPA launched their health and nutrition strategy in late February 2005. This strategy which is currently being implemented, aims to increase the awareness of health and nutrition and empower community members to make healthy dietary choices. Key strategies are presented in Table 9.2.

Table 9.2 Key strategies, ALPA health and nutrition strategy, 2005

- Breaking down dependency – creating more local jobs and engaging youth in employment and training
- Developing a range of Aboriginal traditional foods.
- Expanding our range in stores with a nutritional bias, and accompany this with promotions and consumer education
- Reducing margins on nutritional lines to stimulate sales and increase consumption
- Developing in-store bakeries for fresh daily products and creating employment
- Upgrading and expanding take-away equipment to increase volume of healthy choice lines
- Appointing an Aboriginal staff member as Store Good Food person
- Appointing a community-based Nutritionist to work with stores, community agencies and health services

ALPA viewed success in the implementation of this strategy as hinging on the compliance of store managers (Interviewee, 2005). Store level management was expected to comply with the nutrition and health strategy. It was evident that successful implementation however would also require a concomitant emphasis on workforce development and training.
As shown previously in the literature and supported by the present study, store managers are central to effective store operations and thereby central to a whole-of-store approach to improved store practices and better food quality. This case study highlights the ability of an organisation to increase the turnover of fresh fruit and vegetables through improved infrastructure and organisational commitment to improving the food supply. Ongoing feedback on performance in addition to the input of an external collaborator who developed a relationship with ALPA based on trust rather than cynicism played a critical role in facilitating change. In an environment where recruitment of experienced management is limited, it is likely that creating a supportive environment for store managers to effectively govern stores, in addition to improved infrastructure, will be required to maintain and enable further increases in the turnover of fruit and vegetables.

9.4.2. Negotiating a partnership between profit and health

ALPA considers the relationship between profit and health as a partnership, where good profits lead to available funds for investing in nutrition promotion and imposing subsidies on “healthy” foods. As in any partnership, tension is an integral part of the relationship. This section examines the partnership between profit and health and the underlying tensions that remote community stores face in endeavouring to achieve a viable business and meet both social and moral obligations.

A letter to ALPA in the 1970s from Ian Yule, the assistant principal of the community school, appears to be the first in proposing the store as a service responsible for the life or death of community people. An excerpt from this letter reads:

……a study of the nutritional needs of this community in conjunction with the community development workers and adult educators would reveal deficiencies. The store could then import the kind of foodstuffs needed to meet these deficiencies. It would then be providing a service which could mean the difference between life and death for people here."
Even in the early days of the establishment of ALPA, tension existed in operating efficiently as a business and in fulfilling its social development role in the member communities. Accusations of over pricing and strained public relations were apparent. The following excerpt from a report presented at the 7th annual meeting of ALPA in 1974 exemplifies this tension:

consistently throughout the year, there has been confused opinions expressed to us as to: 1. the role of ALPA in the community and; 2. the future developmental program of ALPA. There remains a basic mistrust in the store’s role. It seems necessary therefore that more education is needed along the lines of ALPA’s role in communities and future developmental programs geared to educating the public about ALPA’s final aims for stores in Arnhemland.

Community stores are often expected to play a dual role of “benevolent enterprise” and “profit-generating business.” The attention on stores in being responsible for the nutritional needs of the community and debate concerning stores as enterprises for profit or as an essential community service continues to the present day. The predominant store trading arrangement is the community owned not-for-profit corporation often with the commitment to return profits for community benefit. In addition to providing a retail service, the store often provides other services such as banking, post-office and community sponsor. Furthermore, pressure is placed on stores, contrary to stores in urban areas, to provide a health and nutrition service.

The Anangu Pitjantjatjara Yankunytjatjara (APY) stores in South Australia have developed a policy document that takes a human rights stance and clearly differentiates the store as playing a role in the holistic delivery of primary health care through providing employment, education, and health promotion. This policy is based on the principle that residents of the APY lands by right of their citizenship are entitled to access safe, affordable and nutritious food. In this regard, the store is viewed as a not-for-profit, benevolent enterprise, dependent on government subsidies which may not be guaranteed. Contrary to the APY stores’ dependence on government subsidies to achieve an equitable food supply for people, ALPA have focused more on profits, to enable benevolent activities to occur and to achieve a viable and successful Yolngu enterprise that can be self-sustaining. ALPA therefore
is not dependent on government subsidies. ALPA foresees that reduced margins on food items will be achievable in the near future without government assistance as a result of good commercial practices (Personal communication, ALPA General Manager, 2006). Despite the multiple roles expected of stores, a negative attitude towards store services is frequently portrayed\textsuperscript{127,164}.

The challenges to remote community stores are great. For example, to sustain the nutritional changes in the Buranga store in the East Katherine region, Taylor and Westbury reported that substantial infrastructure improvements were required. These included the replacement of the store which was basically “an ageing iron shed,” instalment of air-conditioning and improved refrigeration facilities\textsuperscript{157}. Maintenance and infrastructure costs are enormous. Stores that have been poorly managed or service a small population may not have the capacity to undertake capital works necessary for nutrition improvement. Considering these challenges, as McMillan commented in the 1990s, it is of little surprise that store managers when confronted with an enthusiastic health practitioner with an agenda to improve the nutritional quality of the food supply are sometimes defensive or unco-operative\textsuperscript{126}.

In 1990 ALPA introduced a corporate nutrition policy acknowledging the impact of nutrition-related illness on the health of Indigenous communities\textsuperscript{126} (Appendix 9, p 462). The aim was to increase the variety of nutritionally desirable foods available in community stores at all time. A key strategy to promote consumption of recommended foods was to recruit and train a Yolngu staff member in each community store to work as a “Good Food” person and guide people’s food choices through the use of “shelf talkers”. Lee et al\textsuperscript{129} evaluated the ALPA food and nutrition policy in 1993 and showed that most aspects of the ALPA nutrition policy that related to the provision of specific recommended foods were implemented. The most significant improvements in the turnover of recommended foods over the three year implementation period was shown for fresh fruit and vegetables and the provision of canola margarine and oil in all stores. Policy promotional and educational initiatives were not as well implemented\textsuperscript{129}.

The following section demonstrates that even for organisations such as ALPA that is committed to and has invested substantially in improving the health and nutrition of
Aboriginal people living in remote communities, there is underlaying tension in negotiating a partnership between profit and health. This tension is inevitable considering the unique position of community stores in being expected to 1) provide a food supply to meet the nutritional needs of the community; 2) meet social obligations expected of stores by the community; and, 3) be seen as proactive in nutrition education and promotion. Throughout the period of the present study, this tension was particularly evident in relation to the sale of confectionery and take-away food.

Levying a special tax on foods high in fat or sugar to subsidise “healthful” foods has been suggested in the public health arena as an environmental strategy to influence food choice\textsuperscript{466}. In the United States, Jeffrey et al\textsuperscript{467} reported a three-fold increase in sales of fruit and salad in a university cafeteria on increasing the variety of available choices and reducing the sales price by 50\% over a three week intervention period. A subsequent study by French et al\textsuperscript{468} showed that sales of low-fat snacks (which included confectionery high in sugar and low in fat) from vending machines in a university setting increased significantly when prices were reduced in the absence of concurrent nutrition education. The volume increase in low-fat snacks during the intervention period was not sufficient to offset the reduced profit margin and resulted in a net revenue loss. French et al concluded that a simultaneous price increase for high-fat items would be required to achieve net revenue gains\textsuperscript{468}. These studies suggest that point-of-sale food choices can be influenced by price incentives. ALPA employ a similar strategy where profits are maximised on foods considered less healthy, such as confectionery and take-away foods, in order to subsidise the freight on fruit and vegetables.

Early in the period of this study, a number of “novelty” confectionery lines were introduced into the store. These were very popular with young children. Not only was the take-away manager particularly concerned about the amount and type of confectionery for sale, the take-away staff also expressed concern about the quantity of confectionery making comments such as: “there are too many lollies”; “[we are] killing people with all this sugar”, and; “too many people dying from sickness” (Field notes, 2004). On one morning I observed 85 transactions in the take-away in a four hour period of which two-thirds of the transactions were by children or young
adults. Few transactions were by older people. Comparable to observations made in other Aboriginal communities, more than half of the transactions made by young children were for a sweetened beverage or confectionery. The store manager viewed confectionery as a necessary item to “keep viable”. Confectionery attracted an 80% mark-up according to the store manager and therefore made “a profit with so little effort”, as it does in mainstream retailing (Personal communication, store manager, 2004).

Contrary to other store interventions such as the APY Mai Wiru policy that aims to improve nutrition through restriction of certain products considered “unhealthy” such as added sugar beverages and confectionery, ALPA have based their policy on providing a “choice service”. The concept of “choice” is a very strong policy driver for ALPA and has been firmly instigated by the Board of Directors. This is based on the principle of non-paternalism and directing choice through promotion and education rather than through restriction. ALPA advocates that Aboriginal people have the right to select from a full range of food choices as do people in mainstream Australia. The choice argument is espoused widely by ALPA store managers. For example, one store manager in questioning the concept of a community food coalition expressed that “ALPA will not dictate to [the private] take-aways and schools [school canteen]....there is to be choice” (Field notes, 2005).

The paradox however, is that retailing traditionally, is about influencing choice to maximise profit. It is normal commercial practice to maximise performance in all food categories. The “benevolent choice” motive therefore can easily be exploited for example, when marketing a product that attracts a high profit margin such as confectionery, over a product with a lower profit margin, such as fruit. A retailer in mainstream has the marketing right to maximise profit on confectionery, hence the typical colourful displays of confectionery observed at the point-of-sale, easily accessible by children. The fundamental question that arises in negotiating a partnership between profit and health is whether remote community stores should have the same marketing rights as mainstream stores to influence people’s food choices so as to maximise profit. Remote community stores, such as ALPA, may employ strategies such as placing fresh or dried fruit rather than confectionery at the point-of-sale to influence food purchasing.
In the situation where demands are placed on stores to provide a benevolent service for the community, increased margins and marketing of confectionery, for example, becomes an attractive option. A further tension in relation to profit and health is the retail practice commonly employed in remote community stores of cross-subsidising recommended foods against “undesirable” products such as cigarettes or high-fat take-away food. While the studies conducted in university settings, school and worksite cafeterias in the USA, suggest that price incentives can influence food choice, the effectiveness of price manipulation on influencing food choice in a remote community store setting in Aboriginal Australia has not been assessed.

In a retail environment where there is limited or no competition, there is the risk of both limited choice and exploitive choice. In this case study, the take-away provides an opportunity to explore the issue of profit versus choice. The issue of inadequate infrastructure in relation to change is also examined.

In 2003 it was reported by ALPA that pre-prepared components such as pre-cooked roasted meals and frozen vegetables with a commercial sauce were used in the community stores “if there was not time to prepare dishes from scratch”. The reality for the Galiwin’ku store however, was that time, inadequate facilities, staff turnover and absenteeism, concern regarding profit, and inadequate attention to workforce training and development, resulted in hotdogs, chicken wings, pies and hamburgers being the norm and prepared meals being the exception. While there was a demand for hamburgers and chicken, customers were said to enjoy freshly prepared meals when available:

People ask for different foods, too much of the same kind of foods….people really liked the foods the old lady cooked [take-away manager], she makes manymak ngatha [good food]…people always asking for oily food, where’s the chicken wing? Where’s the drumstick?..if they didn’t have these foods then [they] ask for fresh ngatha [food], people like fresh food, haven’t got the time…too busy in the take-away (Field notes, 2004).

Indeed store management were aware of the inability of take-away staff to meet the demand for freshly prepared food:
The take away co-ordinator at [another ALPA member community], said that when she prepared two hot dishes, a mountain of boiled eggs, and other foods they were sold in the first few hours. [We] do not have the capacity to pump out what is needed. [We are then] in the position of either not having anything available or putting out the crumbed chicken sticks from the heat and eat range” (Meeting minutes, 2004).

At the time of this study, rather than this demand being viewed as an opportunity for sales, it presented as a problem for ALPA. Four underlying reasons emerged for the perceived inability to meet the demand for freshly prepared food and the emphasis on pre-prepared foods. The first reason related to inadequate infrastructure and food preparation facilities. At the time of the present study, the take-away at Galiwin’ku was not air-conditioned. The staff worked in very hot and humid conditions and with limited equipment. Secondly the Aboriginal staff, while encouraged to prepare different meals, were not provided with adequate support and training. Staff absenteeism because of funerals, sickness or card games, also posed problems. Thirdly, the inadequacy of the facility, the demand for take-away food and beverages and the number of available staff, resulted in inadequate time being available to prepare meals and other foods. Lastly, emphasis was given to the foods that required little preparation in order to maintain sales and profit:

It’s a busy little take-away, it does not stop. And it’s tiny, everything in there is too small, the fire is too small, the oven is too small, I mean everything is too small for the size and amount of money that pushes through, pushes out of it….I mean, I worked in there for 18 months, some days you go, go, go, just to keep enough food up, just to keep it flowing. But if they want us to spend the two hours creating nutrition meals, fresh sandwiches and all that, it can be done, but we’ll lose that volume of food and there’ll be a time when there’s no food….and then we get the phone call [saying] why have the sales dropped? Why are the take-aways not running properly? An you just think…well I’ll just, you know, I’ll push it all (Interviewee, 2004).

While the store manager questioned whether 15 or 20 sandwiches would really make a difference anyway, the cook for the private take-away proprietor considered fresh
and quality food to be an important choice to provide for people. As a professional cook she refused to work with poor quality produce and made an effort to maintain the freshness of the produce. For example, for lettuce to last a week, she took the outer leaves off, washed and wrapped the lettuce. Her approach was to work with the challenges and slowly introduce change. Over time, she commented that she had eliminated three fast food lines and replaced them with hot meals, although deep fried fish and chips were still a big seller. She observed that some customers were choosing cooked meals in preference to fish and chips and were asking for “fresh food” and responding with statements such as “since I’ve been buying your food, my stomach feels good” (Field notes, 2004).

It is evident from this case study that in relation to the ALPA take-away at the time of this study, choice was compromised by inadequate facilities, training issues, and a strong profit motive. The result was less healthy food options available for sale. On the other hand, the private take-away proprietor, with a professional cook at hand, was in a position to respond positively and take advantage of an increasing demand for freshly prepared food. This demand was partly created as the result of a Health Festival where for the week of the Festival the private take-away proprietor prepared no fried fish and hot chips, and only prepared freshly prepared meals. After the Festival, people continued to request certain dishes such as beef with rice and shepherd’s pie:

During the healthy lifestyle festival we did not sell fish and chips. People did not seem to miss them. It was extra work preparing all the different meal varieties, but was worth it (Field notes, 2004).

ALPA responded to the situation of poor take-away facilities and have since built a new take-away and have included in their nutrition and health strategy the upgrading of take-away facilities to increase the healthy choice lines. The take-away proprietor has also renovated his take-away facility. An increasing demand for better quality food coupled with the competition created between two food outlets facilitated the change required to improve the choices available to people.
In an environment where the store and take-away are the sole food retailers and have a responsibility to provide a nutritious food supply and where there is a closed and captured market, tension within negotiating a partnership between profit and health is inevitable. In this unique situation, food retailers have a moral duty to provide food choice. Although a priority goal of government level national food- and nutrition-related policies, there is no comprehensive strategy in action to ensure a quality and affordable food supply available to people in remote regions of Australia - in most remote community stores, it is entirely dependent on the good-will and integrity of store managers and store governing bodies and commitment to improving the health and nutrition of Aboriginal people by organisations such as ALPA. Similarly there is no government legislation regulating the display of prices of food items in Australian retail outlets. Hence, in an environment where limited competition exists, transparency of prices of food items through accurate display of prices in remote community stores and other food outlets generally does not occur. In the situation of limited or no competition, particularly where prejudiced views on Aboriginal food preferences prevail, there is the potential that choice will be compromised for profit. From a nutritional viewpoint, where retailers are operating in a monopoly situation, it could be argued that greater surveillance of the food supply would be appropriate.

9.4.3. Appropriate training and workforce development

ALPA was established in the early years of the self determination era where the commitment to developing the capacity of Yolngu to independently manage a viable business was foremost in the operations of ALPA. Three young men were supported to undertake training in wholesale supply and ordering and retail management in Darwin and Brisbane. A training school was purpose-built at Galiwin’ku in 1980 to support in-house training and, with assistance from the Queensland College of Retailing, a specialised curriculum for training Aboriginal store workers was developed.126

Hope for Yolngu management of the Galiwin’ku store grew in July 1980 when the Galiwin’ku council expressed interest to ALPA in taking over the Galiwin’ku store471. The appointment of independent Yolngu management has never been
realised in the history of ALPA. On an evaluation of the ALPA enterprise, Young concluded in 1993 that tension between profit and community development had offset the commitment of ALPA to self-management, as achieving Aboriginal control and maintaining high levels of enterprise performance were probably not compatible\textsuperscript{459}. On the other hand ALPA believes that cultural obligations to traditional kinship have prevented Aboriginal people taking on management responsibility. The employment of Yolngu staff however is viewed today as it was by Wesley Lanhapuy, the then town clerk of Galiwin’ku (Elcho Island) community in the 1970s, as one of ALPA’s greatest achievements.

What is important that is taking place is, is the amount of responsibility that is being given to the Yolngu workers who are employed at the store. This to me personally is one of ALPA’s greatest achievements here at Galiwin’ku\textsuperscript{472}.

Currently ALPA employs 30 Yolngu staff and five non-Aboriginal staff at Galiwin’ku. Many of these employees have given years of service to ALPA. One employee for example has worked with ALPA for more than 25 years and has managed the store intermittently in the absence of the store manager.

The concept of the training school was disbanded in the 1980s and an alternate mode of training adopted. ALPA have a training agreement with Coles Supermarkets Pty Ltd where the intention is “to work together in developing the retail skills and knowledge of ALPA employees in remote communities and to foster greater cultural understanding of both parties”\textsuperscript{231}.

The following section explores the construct of appropriate training and workforce development in relation to changes in the nutritional quality of the food supply and focuses on the informal training that was observed in the take-away over the study period. Three central constructs emerged from the data in relation to the theme of appropriate workforce development and training. These were: 1) on-the-job training and working alongside each other; 2) attracting the right people; and, 3) a supportive environment for staff to maintain motivation.
On the job training and working alongside each other

Staff work hard in the take-away that is 10 degrees hotter than working at the register where you can sit on a chair….to make changes and maintain changes, [you] need to get in there with the staff and assist them….Change to prepare healthier food could be cultivated as there is interest, people turn up to work (Field notes, 2004).

In February 2004 the non-Aboriginal take-away manager who was responsible for training of the Aboriginal take-away staff was also the night cook and worked the evening shift from 3pm to 10pm. The Aboriginal staff worked at the front counter while the night cook was on duty. Under this arrangement there were no opportunities for training or support of the Aboriginal staff. The Aboriginal head cook had participated in a one week cooking course conducted by a Master Chef with the Charles Darwin University. However on returning to her workplace, it was difficult for her to implement any of what she had learnt. The Aboriginal staff had established a routine and worked hard in the take-away to prepare egg and bacon sandwiches for breakfast, hamburgers and hotdogs, and to continually top up the bain-marie with oven-heated chicken wings, pies and chicken kebabs. Occasionally a beef and frozen vegetable stew was made.

After dismissal of the take-away manager in April 2004, ALPA introduced a pre-prepared meal concept that required heating and serving. This was to ensure the daily availability of a hot meal without the staff having to freshly prepare food. During the study period there were two critical incidents where significant changes occurred in the take-away that resulted in improvements in the quality of the food available for sale and positive feedback from customers. The first change occurred towards the end of 2004 during the period of employment of a young man who quickly established a good rapport with the Aboriginal staff and was keen to share recipes and cooking skills. The approach and attitude of this employee created a work environment that was conducive to informal on-the-job training. He was successful in motivating and supporting employees to be innovative in food preparation. The store manager commented on the impact of this person in comparison to that of other training models:
He’s married to a Yolngu lady, he understands them, talks their language….they like him, [they] respect him, and they’re not afraid of him. Some other whitefella coming here, ranting and raving at them, they just wouldn’t listen, you know, they just wouldn’t take much notice, but with someone like [the take-away cook], they listen and they know because he just tries to tell them, this is good ngatha [food], this is healthy food, this is how you do it. Need to spend some major, one on one, daily quality time with [the staff] (Interviewee, 2004).

For the period that this person was employed the staff were motivated to prepare different meals and the customers responded positively. The impact of this person also reflected positively on take-away sales and demonstrated that sales could be maintained with increased effort to ensure good quality food:

The apricot chicken…they [the staff] found out just how easy that was to make, how nice it was to eat, because it had all the different flavour in it. They said, I didn’t know it was that simple. And it was that simple…and they said, we want to cook that again today…. (Interviewee, 2004).

The take-away cook left the community after a short period and was replaced by an equally enthusiastic and motivated person who also quickly established a good rapport with the staff. While this person had only recently arrived in the community, her partner had a long relationship with people in the community and was widely respected. This cook encouraged the staff to prepare salads and sandwiches, and showed them how to bake cakes and desserts. During the period of this person’s employment, the take-away received requests from community people as well as community departments to prepare fruit platters, cakes, and luncheons, for meetings and family parties. Through working alongside the Aboriginal staff and encouraging them in preparing different foods to what they were used to preparing, the staff gained the confidence to prepare foods independently. One employee after three months of working in the take-away independently started to prepare salads. The take-away cook commented that it did not take her long to prepare and that they all sold. During this period I observed that besides the normal fast foods, there were always salads and sandwiches displayed in the take-away refrigerator and less confectionery displayed.
Finding the right people

The two periods described above were characterised by the employment of two exceptional people whom were motivated and were willing to share their cooking skills and work alongside the staff to encourage them to prepare different foods. Finding the right people and supporting them to remain motivated however posed a challenge to facilitating and maintaining change. An ex-employee of the privately owned take-away outlet commented:

It’s difficult to work with people that come to work in the take-away, [they’re] not interested, don’t care and racist. [It’s] hard to get the right people, they either have no idea or are over-qualified (Field notes, 2004).

This view was supported by an employee of the privately owned take-away outlet who commented:

It is my conscience as a professional food person….I have seen food preparation that gives you the shivers. It starts with professional people, you don’t have to be a chef….there have been too many unprofessionals, from the alcoholics to the criminals (Field notes, 2004).

Maintaining a quality standard required ongoing motivation and was difficult to sustain under the working conditions (Interviewee, 2004). The relationship developed between the ALPA take-away cook and the Aboriginal staff was key to facilitating the range of healthy options available, as was the relationship between the staff member and the customer. The importance of this relationship was particularly noticeable in the private take-away where there are no Aboriginal people employed and so extra effort is required by the staff to develop rapport with the customers. Those staff that made an effort to establish a good rapport with the customer relished the positive feed-back they received. These staff took pleasure in serving quality food in addition to making an effort to display the food attractively and explaining to the customer the different dishes available.

It’s about preparing the meals and putting it out an displaying them here people can see them and will buy them….and putting out meals that taste nice, like beef and...
rice….and hot dish with beef is popular….A lot of people come to buy meals. If one person buys something and it tastes nice, not long after many people will come buying or asking for the same thing (Field notes, 2004).

9.4.4. Role of feed-back

Community food outlets, particularly stores, are viewed by many researchers and health practitioners as suppliers of non-nutritious food and the consumers the innocent victims of a ruthless manager’s relentless quest for the dollar. An analogy of the community store to the ration depot, implies that the store perpetuates the control of food in remote communities that non-Aboriginal people have dominated since missions and settlements were established158. As occurred with the provision of rations, the store is a very visible target for intervention and control of the food supply. In this respect present government scrutiny of the store could be viewed as a continuation of the government scrutiny of missions that occurred during the assimilation era. Saethre believed that in the community where he based his study, that much of the blame directed on the store by community Aboriginal people as well as non Aboriginal health practitioners and residents, was unwarranted. Expressed by people in the study community was the perceived powerlessness to influence the nutritional quality of the food supply and have input into store processes.

Over the period of the present study, I observed the results of both negative and constructive feed-back. The negative feed-back observed was largely in the form of formal criticism that occurred without prior discussion with ALPA. At the organisational level, negative feed-back tended to trigger a defensive response that consumed a lot of energy and impacted adversely on working relationships. It exposed the fragility of managers and their exaggerated determination to defend themselves as progressive, moral and nutritionally informed. I also observed potentially significant negative feed-back receiving no response. For example, a letter, anonymously sent to the NT Minister assisting the Chief Minister on Indigenous Affairs and the local member for Arnhemland, raising issues about the cost of food in remote food retail outlets in general, and consequential hardship and
hunger, was not supported by the community council as the complaint had not previously been brought to their attention (Interviewee, 2003).

Constructive feedback however, which often supported the negative feedback, opened relationships and provided opportunities for discussing issues and supporting change for improvement. For example, highlighting the level of fruit and vegetable consumption as a concern through community workshops, and bringing to ALPA’s attention the inadequate provision of fruit and vegetable, which was further supported by the NT MBS, triggered a positive response. Key to nurturing change for improvements in the nutritional quality of the food supply, however, was the initiative led by the independent wholesaler, to develop a collaborative relationship between ALPA and other key players.

Food retail managers are expected to respond positively to various government officials from nutritionists, doctors, nurses, environmental health officers, teachers and suppliers. Nutritionists, for example, on visiting the store make recommendations to store managers to stock various nutritional products such as reduced fat cheese or high iron infant rice cereal or to not stock infant formula. During the study period, the health centre medical officer had requested the store manager to order certain “high iron” foods that the health centre was to then market as high in iron using “shelf-talkers”.

Opportunity for intervention is dependent on the relationship formed between the store manager and the nutritionist or health professional and the willingness of the store manager to co-operate with government personnel. On the other hand, it is the core business of nutritionists as government officials to encourage store managers to consider nutritional objectives in their store operations. One clearly defined government strategy in relation to community stores is the annual collection of data for the Market Basket Survey and the feeding back of this to store managers, or where relevant, store committees and councils. This is organised by the visiting nutritionists.

Other activities occur in an ad hoc manner and depend on the nutritionist or other health professionals seeking opportunities to intervene at the store level. This may
take the form of providing nutrition education and training for store employees, carrying out in-store promotional activities such as cooking demonstrations and guiding food choices through shelf labelling, or at a more strategic level, facilitating the development of a store-based nutrition policy. Three nutritionists entered and exited during the study period. All three endeavoured to influence the nutritional quality of the food supply in various ways. McMillan\textsuperscript{126} presents a realistic perspective of store managers working in isolation and across cultures, and often feeling overworked, under-resourced and underpaid. He highlighted how store managers perceive their job, and how they accept and adapt to additional roles\textsuperscript{126}. The added strain of a demand for nutritional value – could be the ‘straw that breaks the camel’s back’ - particularly when the “push is from someone viewed as an outsider”\textsuperscript{126}.

9.5. Discussion

The findings indicate that efforts were made in three key areas to improve the food supply: 1) fresh fruit and vegetables, 2) confectionery, and 3) take-away food. Focusing on these three areas, certain practices were revealed that either hindered or facilitated change to improve the nutritional quality of the food supply. Change was not a straightforward process of identifying the problem, planning, implementing solutions and monitoring progress. Rather, it involved backward and forward and often reactive steps where a number of enablers some planned and others fortuitous, were slowly put in place. These enablers, as summarised in Table 9.1, comprised competent management and supportive organisational procedures and policies, infrastructure improvements, and appropriate workforce development and training. A key challenge was in negotiating a partnership between profit and health at the organisational level. While initiating change for improving the nutritional quality of the food supply did not entirely hinge on the store manager, the store manager was critical in creating a work environment that was conducive to maintaining either poor or good nutrition practices.

Two underlying constructs salient to the change process were the importance of relationships and the role of feedback. Relationships occurred at three levels: the
relationship between staff and customers; between store management and staff; and between key stakeholders (including community leaders and health professionals) and store management. The relationships established at these three levels were significant in creating a supportive environment for change. Both negative and constructive feedback played a critical role in facilitating and maintaining change. Feedback occurred at a number of levels: feedback at a personal level between the customer and staff member; feedback at the community level, and feedback at the organisational level.

The challenges in improving nutritional quality of the food supply, as detailed in this chapter, and the many different players involved at various stages, highlights the need for a strategic and comprehensive approach to support improved nutritional outcomes at the store level. This insight makes the current situation of different people independently trying to “fix” stores, through recommending to the store manager particular foods to stock or not stock, and advising on the display and promotion of certain foods considered of nutritional importance, seem futile in the long term. Indeed the current ad hoc intervention of health professionals, although well-meaning, is distracting and can be counter-productive. The example given in this case study of recommending special “high-iron” foods illustrates the medicalisation of nutrition by health professionals and the undermining of Aboriginal people’s common sense about food and their food preferences for natural, fresh food, rather than packaged and manufactured foods. An approach is needed for nutrition improvement in the store setting that is more strategic and less dependent on individuals, particularly when there is such a high turnover.

The focus on fresh fruit and vegetables resulted in a marked increase in turnover over a one year period. This increase did not occur through simply increasing the order for fruit and vegetables. Improving the display and presentation of the fruit and vegetables and allocating more store space to fruit and vegetables was key to increasing turnover. This initiative however was supported by improved store infrastructure such as the installation of scanning equipment and air-conditioning and negotiations with suppliers for a better deal. Organisation policy helped to maintain a focus on fresh fruit and vegetables. As suggested previously, attention to workforce development and training was required to help maintain an increase in the
turnover of fresh fruit and vegetables. The impact of individual interventions on turnover cannot be determined from this case study as the interventions occurred somewhat simultaneously and were complementary.

Based on the facilitators, barriers and challenges influencing the nutritional quality of the food supply as identified through this case study, we propose that for stores to deal with these, that they employ a simple model to direct policies, procedures and practices. One model that we suggest draws on the NSW health framework for capacity building and Continuous Quality Improvement (CQI) theory as shown in Figure 9.1. This model supports a collaborative whole-of-store approach to improve the nutritional quality of the food supply as noted by Taylor and Westbury. A whole-of-store or systems approach to achieving nutritional outcomes rather than a sole focus on nutrition, may have a two-fold affect of achieving store management co-operation, in addition to establishing sustainable structures that support good nutrition. Key to the success of this approach is the consideration of relationships and mechanisms for ongoing feed-back.

The constructs and elements summarised in Table 9.1 that were significant in influencing improvements in the nutritional quality of the food supply, fit within the five key action areas of the NSW health “Framework for building capacity to improve health”: organisational development, workforce development, resource allocation, partnerships and leadership. The underpinning principle of this framework is to build the capacity of the system to support change. This framework was primarily developed to build the capacity of health service systems. It draws on organisational theory and can therefore be applied to systems in general. It seems suited to remote community stores considering their unique position in providing the majority of the food supply for people in remote communities, and thereby being an investment in people’s health.

The framework ensures that the context of the organisation is considered in building capacity and implementing change for health improvement. An important aspect of the Aboriginal community stores context is the history of colonisation and the present endeavour of Aboriginal people to regain control over decisions and structures impacting on their lives. In this respect an important consideration in
applying this framework to community stores, is the active engagement of key community people. Both a participatory action framework and the Guidelines for the Ethical Conduct of Aboriginal and Torres Strait Islander Health Research\textsuperscript{475} provide key principles to underpin implementation of the capacity building model.

Feed-back was identified through the case study as critical to both triggering and sustaining action to improve the nutritional quality of the food supply. This feed-back was neither managed nor always constructive and often provoked an unsustainable reactive response and/or affected already tenuous relationships. CQI theory\textsuperscript{474} used widely in organisational performance management\textsuperscript{476} and more recently in health care systems\textsuperscript{477} provides a theoretically coherent structure by which feed-back can be both managed and built into a framework to support improvements in the nutritional quality of the food supply.

Other benefits of CQI, particularly salient to the context of stores in remote Aboriginal communities, is that it provides a mechanism to move away from a blaming culture and to facilitate participatory action learning and collaboration between key stakeholders including store managers, staff, key community members and health professionals. The focus of CQI is on improvement and the achievement of sometimes small, but feasible and sustainable incremental improvements\textsuperscript{478}. The broad principle of plan, do, study, act, which underlies the cyclic CQI process can be adapted in all contexts.
Figure 9.1 Capacity Building Framework and CQI for improved nutrition in community stores (adapted from NSW Health Capacity building framework, 2001 and CQI theory)
In summary, a proposed model to guide nutritional improvement in remote community stores, as shown in Figure 9.1, incorporates both the NSW health capacity building framework and CQI theory. This model supports collaborative planning and evaluation for better business practices and nutrition outcomes. Application of this model in the stores setting would firstly require an assessment of each of the five key action areas to identify areas that needed strengthening. From this assessment an action plan would then be negotiated, implemented, monitored, performance evaluated and the action plan refined or modified through a process of continuous quality improvement.

The reality of applying this framework in light of the findings of this chapter needs to be considered. The effectiveness of this model hinges on the key areas identified in Table 9.1. Foremost is the importance of competent store and organisational management. A central construct of the capacity building framework is to develop high level leadership across the system. Competent management as shown in this case study impacts on workforce morale, relationships between management and staff and between the store and the community, and staff confidence. To enable nutrition improvement, store management at the store level was shown to need support of appropriate organisational policy and procedures that incorporated nutrition objectives. Management cannot be left to chance. Attracting experienced management staff to fill positions in remote areas is a challenge and a costly exercise. ALPA is continually considering the support structures required to ensure good store governance. A re-commitment to achieving Yolngu management, while resource intense in the short-term, may help to redress the ongoing challenges of high turnover, and the sometimes cultural incompetence of store management.

Secondly, investing resources in adequate infrastructure is essential to achieve a good quality food supply. This case study demonstrated marked improvements in fruit and vegetable turnover with improved instore display facilities. Improving infrastructure however was not a stand alone strategy. It was supported by organisational commitment to improving fresh fruit and vegetable turnover through a better quality supplier, and through investing resources in the display and packaging of produce, rather than leaving produce in the storage chiller. This demonstrates the
multi-faceted systems approach required to support improvement in the nutritional quality of the food supply.

Thirdly attention to workforce development and training is essential. This case study demonstrated that training need not be complicated. The on-site training that resulted from a trusting and respectful relationship between the staff and trainer was simple but effective. Obvious from this case study was that this model of training needs to be recognised and valued by organisational management, and resources invested to enable trainers to focus on training and mentoring rather than on the day-to-day management of the take-away for example.

The tension in negotiating a partnership between profit and health is always going to be there. This case study has demonstrated that this tension poses as a challenge even for an Aboriginal organisation that is committed to improving the health and well-being of Aboriginal people such as ALPA. This tension needs to be made transparent by remote community stores and the community supported and empowered to decide how they want the store to operate: a profitable enterprise with surplus to support community level economic and social development, or reduced price margins without the store playing the other roles expected of a benevolent enterprise. A key issue relates to the ethics of certain retailing practices in a captured and closed market. Special consideration is required regarding legislation governing retail practices in remote community stores, mainly marketing rights and the display of prices. Research is also required to evaluate the impact of pricing incentives on food purchasing behaviour.

Lastly the role of feed-back is critical. Feedback however needs to be constructive and managed and be part of an ongoing cycle for improvement such as that proposed in Figure 9.1.

The feasibility and effectiveness of this model and its transferability to other store contexts needs to be tested through future research. The constructs identified and described through the present case-study, are supported by those identified in the literature as influencing the nutritional quality of the food supply across a wide range of communities and different store enterprises. These constructs need further
examination to develop appropriate strategies and system level indicators to evaluate system improvements and their impact on the nutritional quality of the food supply. There is a large gap between the rhetoric of policy documents to improve Aboriginal people’s access to an equitable and affordable food supply and the development of comprehensive strategies to achieve this at the community level. The proposed model provides a structured and comprehensive approach to move forward in achieving a more equitable food supply for Aboriginal people living in remote Australia and provides a basis for future research.
Chapter 10. Looking back, moving forward: A monitoring tool to support improvements in the nutritional quality of the food supply

Chapter 5 highlighted the need to develop a simplified version of the store-turnover technique to monitor the dietary quality of the food supply in remote Indigenous communities. The previous chapter proposed a capacity building and continuous quality improvement (CQI) framework to support nutrition improvement in the community store setting. This chapter outlines the development of a monitoring tool that has the potential to be widely applied to monitor trends in the nutritional quality of foods purchased in remote Indigenous communities, as part of the capacity building and CQI framework.

10.1. Introduction

It is recognised that issues of availability, quality and affordability of nutritious foods in remote community stores and take-away food outlets, are barriers to Indigenous Australians eating healthy food. The Northern Territory Food and Nutrition Policy and the National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan (NATSINSAP), 2000 to 2010 aim to reduce these barriers and improve the nutritional quality of the food supply in remote Indigenous communities (Appendix 10, p 463-465). Appendix 10 shows the relationship between the national and territory food-related policy documents in terms of 1) goals; 2) priority areas; 3) outcomes; 4) indicators; and, 5) activities.

NATSINSAP offers a suite of action areas from which to develop strategies to improve Indigenous nutritional health. Strategies that relate to the NATSINSAP priority areas, have been developed at a National, State and Territory level, and are currently being implemented. At the community level, implementation of these strategies is largely dependent on the different approaches of individual nutritionists.
In line with NATSINSAP is the Northern Territory Food and Nutrition Policy and a recent tripartite Australian Government initiative called the Remote Indigenous Stores and Take-away project (RIST). This project aims to develop guidelines for remote community stores regarding minimum stocking of nutritional lines, marketing guidelines, minimum standards for display and storage infrastructure, and a training package for store employees. Through programs connected with these initiatives there is presently considerable activity and interest in the food supply in remote communities. The recent Australian government “Outback Stores” initiative is a further long-term strategy that should have far reaching consequences on improving the nutritional quality of the food supply in remote communities.

A system for monitoring the food supply in remote communities is critical to evaluate the impact of these strategies and to inform strategy and policy development at all levels. As shown in the previous chapter, feedback plays a critical role in initiating and maintaining change for nutritional improvement. Chapter 5 concluded that a simple monitoring tool is needed. NATSINSAP has prioritised the development of effective indicators, evaluation criteria, and feedback mechanisms for nutrition-related initiatives.

The Market Basket Survey (MBS) is implemented in the Northern Territory, Northern Queensland and Western Australia on an annual or every two year basis. As discussed in Chapter 5, Section 5.4.13, this survey is designed to monitor the availability, cost and quality of a basket of foods designed to meet 95% of the fortnightly nutritional requirements of a hypothetical family of six. The results of the MBS are disseminated largely by Government employed nutritionists, to store managers and/or store committees and community councils. It is entirely at the discretion of the store manager to act on this feedback. The MBS is not designed to quantify the nutritional adequacy of food available in remote community stores. Besides the MBS survey, there is currently no systematic monitoring of the nutritional quality of the food supply in remote community stores. There are no defined measurable performance indicators to evaluate the effectiveness of food-related strategies. Hence the need for a monitoring tool to address this deficit.
As discussed in Chapter 5, a method for assessing the nutritional composition of foods available in stores was developed by Lee et al\textsuperscript{8} in the late 1980s. This method has also been used by Lee et al\textsuperscript{4} and other researchers\textsuperscript{3,54} to evaluate store and community-based nutrition interventions. It is very resource- and time-intensive, and is dependent on external evaluators. For these reasons it has not been applied widely\textsuperscript{4,54}.

Chapter 5 highlighted that a monitoring system based on indicator foods rather than nutrients would serve to direct the focus and limited resources on the key dietary problem areas in remote communities, namely a high intake of sucrose from sugar and aerated sweet drinks, excess sodium intake, a low intake of fruit and vegetables, wholegrain cereals and dairy or calcium containing foods. The Dietary Guidelines for Australian Adults\textsuperscript{257} and for Children and Adolescents\textsuperscript{258} recommend or discourage particular foods and food groups rather than specific nutrients, as shown in Figure 10.10 (p 327). Furthermore interventions to improve community level dietary quality have targeted specific foods and food groups, not nutrients\textsuperscript{53,54}. The Minjilang project, for example, promoted an increased consumption of fruit and vegetables, wholemeal bread, fruit juice, diet drinks and sandwiches and discouraged high fat take-away foods, sweet drinks and sugar per se. Lee & Bailey\textsuperscript{53}, through measuring the turnover and apparent consumption of these indicator foods and food groups demonstrated an intervention effect which reflected nutrient changes and corresponding changes in serum biochemical markers. Subsequent studies have also targeted similar foods and food groups and reported on shifts in store-turnover of these foods in relation to intervention effect\textsuperscript{54,129}. A monitoring tool that involves tracking selected indicator foods rather than nutrients still requires reliable and regular food turnover data, but does not require regular detailed analyses of the nutritional composition of food available in different community food outlets and settings.

The availability of scanned retail sales data provides potential for nutrition monitoring at all levels: local, State and Territory, and National. Governance of the food supply at the community level has been considered pertinent for community empowerment and to achieve positive change in the nutritional quality of the food supply\textsuperscript{4,54}. A monitoring tool applicable at the community level, supports the ideals
espoused by Lee et al\textsuperscript{4} and Rowley et al\textsuperscript{54}, of community ownership and reducing community dependence on external resources.

10.2. Aim

The aim of this chapter was to define and generate a set of indicators that can be used by key stakeholders as part of a progressive cycle of planning, action and reassessment for improved nutritional quality of the food supply as proposed in the previous chapter. Ideally the development of this tool will provide the impetus for further development of the capacity building and continuous quality improvement framework proposed in the previous chapter and its application across stores in remote Indigenous communities.

10.3. Study design

Scanned food data from the Galiwin’ku store for the period 1\textsuperscript{st} May to 31\textsuperscript{st} July for 2004 and 2005 and store invoice data for 2001 were used to identify key foods contributing to macro- and micro-nutrient availability. Data was first collected in 2001 to correspond with the commencement of the community-based intervention study as described in Chapter 4, where the store was a focal point for facilitating dietary change. The three time periods were included for two purposes: Firstly, to evaluate the robustness of identified key foods through assessing the variation of key foods contributing to nutrient availability over time; and secondly, to assess the sensitivity of the tool to detect change, by applying the performance indicators over the multiple time periods.

Performance indicators to monitor trends in store food throughput were developed based on the key foods contributing to macro- and micro-nutrient availability. Topic areas for monitoring were derived from key dietary concerns (as identified in Chapter 5); the NT Food and Nutrition Policy Priority Areas relevant to the remote store food supply; and the Australian Guidelines for Healthy Eating (Figure 10.10, p 327).
Baselines for each of the performance indicators, and outcome targets, were considered in developing the performance tool. Two levels of targets are needed in developing a performance framework: performance outcome and intermediary targets\textsuperscript{479}. The outcome target as specified in Territory and National Policy documents in relation to the food supply is to achieve recommended intakes of core foods (Appendix 10, p 463-465). In establishing intermediary targets, available resources such as existing capacity, budgets, personnel, infrastructure, time-frames and previous trends need to be considered\textsuperscript{479}. As the assessment of the entirety of these factors was beyond the scope of this thesis, intermediary targets were not determined.

10.4. Method

The method described in Chapter 5, Section 5.4 to assess the nutritional quality of the community food supply applied to this chapter. The three batches of scanned store food data were imported into a Microsoft Access database. Each food product was assigned a nutritional code to link with the AUSNUT database\textsuperscript{251} and a main- and sub-group food category.

10.4.1. Analysis

Determining key foods to monitor outcomes

A number of iterative steps were performed to identify the key foods from which performance indicators were developed. Firstly, the macronutrient profile for each of the data periods was determined. Secondly, the relative contribution of each of the main food groups to total energy intake, total fat intake, total saturated fat and total sugar intake was determined, and thirdly, individual food items contributing \( > 4\% \) of nutrient availability for each of the macro- and micro-nutrients were identified. A cut-off of \( \geq 4\% \) was used to determine moderate food sources of specific nutrients, in line with Chapter 5, Section 5.4.6.
Determining baselines and outcome targets for each performance indicator

Baselines for each of the performance indicators as shown in Table 10.9 (p 333) were derived from the store data collected in 2001. Baselines for performance indicators relating to proportion of food sales were not determined for 2001 as no cost data for 2001 was available. Outcome targets were established for each of the performance indicators based on the recommended number of serves of core foods for the community population, derived from the Australian Guidelines for Healthy Eating (refer to Chapter 5, Section 5.5.6, Table 5.10) and modified to account for the store’s contribution to the total community level availability for each of the relevant foods as determined in Chapter 5, Section 5.5.1.

Applying the indicators

The performance indicators were applied to the 2001, 2004 and 2005 data periods to test the tools responsiveness to relevant changes in the nutritional quality of the store food supply. Differences in the nutritional quality of the food supply across the time periods as detected by the performance indicators were related to corresponding changes observed in nutrient densities between 2001, 2004 and 2005, and changes in the contribution of specific foods to total energy intake and nutrient availability.

10.5. Findings

10.5.1. Determining key foods

Step one: Macronutrient distribution

Table 10.1 shows consistency in the macronutrient profile of store throughput foods over the three data periods. These profiles were consistent with a diet high in carbohydrate, with relatively lower proportions of protein and total fat as discussed in Chapter 5, Section 5.5.3 in relation to 2005 data.
Table 10.1 Macronutrient profile of store scanned data for 2001, 2004 and 2005

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<tr>
<th>Year</th>
<th>2001</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
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<td>11.4</td>
<td>11.7</td>
</tr>
<tr>
<td>Total fat</td>
<td>21.4</td>
<td>23.5</td>
<td>22.3</td>
</tr>
<tr>
<td>Saturated fat</td>
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<td>9.2</td>
<td>8.2</td>
</tr>
<tr>
<td>Total carbohydrate</td>
<td>66.2</td>
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<td>65.4</td>
</tr>
<tr>
<td>Total sugars</td>
<td>33.0</td>
<td>36.9</td>
<td>35.7</td>
</tr>
</tbody>
</table>

Step 2: Contribution of main food group to total energy, fat, fibre and sugar availability

Energy availability

Table 10.2 also shows consistency across the three time periods in the contribution of the main food groups to total energy availability. In all three time periods, cereal and cereal products (mainly bread and flour) and sugar and confectionery (mainly table-sugar) contributed approximately 60% to total energy availability. Beverages, meat and meat products and milk and milk products across the three time periods, were secondary energy sources. The contribution of the food groups: fish and seafood; fruit; sauces and pickles; and, vegetables, to total energy availability was negligible.

Table 10.2 Contribution of main food group to total energy availability for 2001, 2004 and 2005

<table>
<thead>
<tr>
<th>Main food group</th>
<th>Percent contribution of food group to energy availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Cereals &amp; cereal products</td>
<td>44.4</td>
</tr>
<tr>
<td>Sugar &amp; confectionery</td>
<td>21.2</td>
</tr>
<tr>
<td>Milk &amp; milk products</td>
<td>8.6</td>
</tr>
<tr>
<td>Beverages</td>
<td>7.1</td>
</tr>
<tr>
<td>Meat &amp; meat products</td>
<td>8.8</td>
</tr>
<tr>
<td>Fats &amp; oils</td>
<td>5.2</td>
</tr>
<tr>
<td>Sauces, pickles, nuts etc</td>
<td>2.6</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1.1</td>
</tr>
<tr>
<td>Fruit</td>
<td>0.7</td>
</tr>
<tr>
<td>Fish &amp; Seafood</td>
<td>0.1</td>
</tr>
<tr>
<td>Infant</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Total fat availability

The most important contributors to total fat availability for all the three year periods were fats and oils, meat and meat products, cereal and cereal products, and milk and milk products (Table 10.3). There was little variation in the contribution these main food groups contributed to total fat intake across the three years.

Table 10.3 Contribution of main food group to total fat availability for 2001, 2004 and 2005

<table>
<thead>
<tr>
<th>Main food group</th>
<th>Percent contribution to total fat availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Fats &amp; oils</td>
<td>24.3</td>
</tr>
<tr>
<td>Meat &amp; meat products</td>
<td>23.9</td>
</tr>
<tr>
<td>Cereals &amp; cereal products</td>
<td>21.1</td>
</tr>
<tr>
<td>Milk &amp; milk products</td>
<td>19.5</td>
</tr>
<tr>
<td>Beverages</td>
<td>2.0</td>
</tr>
<tr>
<td>Sauces, pickles, nuts etc</td>
<td>7.4</td>
</tr>
<tr>
<td>Sugar &amp; confectionery</td>
<td>0.6</td>
</tr>
<tr>
<td>Vegetables</td>
<td>0.4</td>
</tr>
<tr>
<td>Fruit</td>
<td>0.1</td>
</tr>
<tr>
<td>Fish &amp; Seafood</td>
<td>0.4</td>
</tr>
<tr>
<td>Infant</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Fibre availability

Cereal and cereal products consistently contributed most to fibre availability across all three time periods, followed by vegetables (Table 10.4).

Table 10.4 Contribution of main food group to fibre availability for 2001, 2004 and 2005

<table>
<thead>
<tr>
<th>Main food group</th>
<th>Percent contribution to fibre availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Cereals &amp; cereal products</td>
<td>80.0</td>
</tr>
<tr>
<td>Vegetables</td>
<td>8.0</td>
</tr>
<tr>
<td>Sauces, pickles, nuts etc</td>
<td>5.8</td>
</tr>
<tr>
<td>Fruit</td>
<td>3.1</td>
</tr>
<tr>
<td>Meat &amp; meat products</td>
<td>1.3</td>
</tr>
<tr>
<td>Milk &amp; milk products</td>
<td>0.1</td>
</tr>
<tr>
<td>Beverages</td>
<td>1.0</td>
</tr>
<tr>
<td>Sugar &amp; confectionery</td>
<td>0.5</td>
</tr>
<tr>
<td>Infant</td>
<td>0.1</td>
</tr>
<tr>
<td>Fats &amp; oils</td>
<td>0</td>
</tr>
<tr>
<td>Fish &amp; Seafood</td>
<td>0</td>
</tr>
</tbody>
</table>
Total sugar availability

Across the three time periods, sugar and confectionery contributed principally to total sugar availability, followed by beverages as shown in Table 10.5. For each of the three years, these two main good groups combined, contributed more than 80% to total sugar availability.

Table 10.5 Contribution of main food group to total sugar availability for 2001, 2004 and 2005

<table>
<thead>
<tr>
<th>Main food group</th>
<th>Percent contribution to total sugar availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Sugar &amp; confectionery</td>
<td>65.2</td>
</tr>
<tr>
<td>Beverages</td>
<td>19.5</td>
</tr>
<tr>
<td>Milk &amp; milk products</td>
<td>8.1</td>
</tr>
<tr>
<td>Cereals &amp; cereal products</td>
<td>3.9</td>
</tr>
<tr>
<td>Fruit</td>
<td>1.7</td>
</tr>
<tr>
<td>Vegetables</td>
<td>0.7</td>
</tr>
<tr>
<td>Sauces, pickles, nuts etc</td>
<td>0.5</td>
</tr>
<tr>
<td>Meat &amp; meat products</td>
<td>0.1</td>
</tr>
<tr>
<td>Fats &amp; oils</td>
<td>0</td>
</tr>
<tr>
<td>Fish &amp; Seafood</td>
<td>0</td>
</tr>
<tr>
<td>Infant products</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Step 3: Contribution of individual foods to total nutrient availability

Table 10.6 and Table 10.7 show consistency across the three time periods for the individual foods contributing >4% to each of the macronutrients and selected micronutrients. The food items consistently represented across all three time periods for each of the nutrients are highlighted in bold text. Evident from Table 10.6 and Table 10.7, is the limited number of food items that contributed significantly to nutrient availability. Nineteen food items and condiments were identified as moderate sources of the different nutrients across each of the three time periods. These were: white bread (including a fibre modified bread), white flour, full cream milk powder, sugar (mainly raw sugar), steak, canned corned beef, chicken, margarine, aerated added sugar drinks, cordial, sweet biscuits, weetbix, tea, egg, fruit, vegetables, juice, salt and baking powder (baking powder is used in the preparation of damper).
Table 10.6 Food items contributing ≥4% to the macronutrients for 2001, 2004 and 2005, by order of importance

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>Food sub-groups contributing ≥4% to available nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Flour, sugar, bread, milk powder</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Flour, bread, milk powder, steak, canned corned beef, egg</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Fat</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Margarine, milk powder, bread, canned corned beef, egg, nuts</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Saturated fat</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Margarine, milk powder, butter, sweet biscuits</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Monounsaturated fat</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Margarine, milk powder, oil, chicken, egg, nuts, canned corned beef</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Polyunsaturated fat</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Margarine, bread, flour, oil, nuts</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carbohydrate</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Raw sugar, flour, bread, aerated sweet drinks</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total sugar</strong> (refined sugar)</td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Raw sugar, cola, cordial, milk powder</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fibre</strong></td>
<td><strong>2001</strong></td>
</tr>
<tr>
<td></td>
<td>Bread, flour, weetbix</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 10.7 Food items contributing ≥4% to selected micronutrients for 2001, 2004 and 2005, by order of importance

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>Food items contributing ≥4% to available nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>Flour, bread, weetbix, canned corned beef, steak</td>
</tr>
<tr>
<td></td>
<td>Bread, weetbix, flour, canned corned beef, steak, egg</td>
</tr>
<tr>
<td></td>
<td>Flour, bread, weetbix, canned corned beef</td>
</tr>
<tr>
<td>Calcium</td>
<td>Milk powder, bread, flour, cheese</td>
</tr>
<tr>
<td></td>
<td>Milk powder, bread</td>
</tr>
<tr>
<td></td>
<td>Milk powder, bread</td>
</tr>
<tr>
<td>Total folate</td>
<td>Bread, tea, flour, weetbix, egg</td>
</tr>
<tr>
<td></td>
<td>Weetbix, bread, tea, flour, egg, milk powder</td>
</tr>
<tr>
<td></td>
<td>Bread, weetbix, tea, flour, fresh vegetables</td>
</tr>
<tr>
<td>Zinc</td>
<td>Steak, canned corned beef, bread, milk powder flour</td>
</tr>
<tr>
<td></td>
<td>Steak, canned corned beef, milk powder, bread, chicken, flour</td>
</tr>
<tr>
<td></td>
<td>Bread, canned corned beef, milk powder, steak, flour, egg</td>
</tr>
<tr>
<td>Thiamine</td>
<td>Bread, flour, weetbix, milk powder</td>
</tr>
<tr>
<td></td>
<td>Bread, weetbix, flour, milk powder</td>
</tr>
<tr>
<td></td>
<td>Bread, flour, weetbix, milk powder</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>Milk powder, weetbix, egg</td>
</tr>
<tr>
<td></td>
<td>Milk powder, tea, weetbix, egg</td>
</tr>
<tr>
<td></td>
<td>Milk powder, tea, weetbix, bread, egg</td>
</tr>
<tr>
<td>Niacin</td>
<td>Flour, bread, weetbix, steak</td>
</tr>
<tr>
<td></td>
<td>Chicken, bread, steak, flour, weetbix</td>
</tr>
<tr>
<td></td>
<td>Flour, bread, weetbix, chicken, steak</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Bread, flour, milk powder, tea, nuts</td>
</tr>
<tr>
<td></td>
<td>Bread, milk powder, flour, weetbix, tea</td>
</tr>
<tr>
<td></td>
<td>Bread, flour, milk powder, tea, weetbix, rolled oats</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Orange juice, fresh fruit, fresh veg</td>
</tr>
<tr>
<td></td>
<td>Juice, fresh fruit (orange), fresh veg (potato, swt. potato), cordial, fruit drink</td>
</tr>
<tr>
<td></td>
<td>Fresh veg (potato, broccoli, capsicum), juice, fruit drink, cordial, fresh fruit</td>
</tr>
<tr>
<td>Sodium</td>
<td>Bread, salt, baking powder, canned corned beef</td>
</tr>
<tr>
<td></td>
<td>Salt, bread, baking powder, canned corned beef</td>
</tr>
<tr>
<td></td>
<td>Bread, salt, baking powder, canned corned beef</td>
</tr>
<tr>
<td>B-carotene</td>
<td>Fresh veg, frozen veg (carrots, mixed veg, pumpkin, sweet potato), juice, margarine</td>
</tr>
<tr>
<td></td>
<td>Fresh veg (carrots, pumpkin, swt. Potato), margarine</td>
</tr>
<tr>
<td></td>
<td>Fresh veg (capsicum, carrots, pumpkin, swt. Potato), margarine</td>
</tr>
<tr>
<td>Potassium</td>
<td>Milk powder, flour, bread, steak</td>
</tr>
<tr>
<td></td>
<td>Milk powder, bread, fresh veg, flour, fresh fruit, steak, tea</td>
</tr>
<tr>
<td></td>
<td>Milk powder, fresh veg, bread, flour, pork</td>
</tr>
</tbody>
</table>

Differences in nutrient density over time

Figure 10.1 shows slight increases in the nutrient density of total sugars, total fat and saturated fat from the 2001 baseline. These increases were most pronounced for 2004 and returned to near the baseline level in 2005. This was particularly the trend for saturated fat. There was little variation in the nutrient density of protein and total
carbohydrate over the three time periods. The nutrient density for fibre was lower for 2004 and 2005 compared to 2001.

![Graph showing nutrient density of store turnover for 2004 and 2005 as a proportion of the nutrient density for the 2001 store turnover.]

**Figure 10.1 Macro-nutrient density of the store turnover for 2004 and 2005, as a proportion of the nutrient density for the 2001 store turnover**

Figure 10.2 shows that while the other micro-nutrient densities remained relatively stable over the three time periods, vitamin A retinol equivalents, β-carotene, riboflavin, total folate, vitamin C, calcium and sodium increased between 2001 and 2004. In 2005 the nutrient densities of these same nutrients continued to remain higher than that of 2001 but generally lower than that for 2004, except for calcium. The nutrient density of calcium remained about the same in 2005 compared to 2004, while that of sodium decreased. The most marked increases were shown for both vitamin A retinol equivalent and β-carotene.
Figure 10.2 Micro-nutrient density of the store turnover for 2004 and 2005, as a proportion of the nutrient density for the 2001 store turnover

Food items contributing to changes observed in nutrient density

Fresh vegetables contributed substantially to the increase observed in the nutrient density of both β-carotene and vitamin C for both 2004 and 2005 (Figure 10.3 and Figure 10.4). A slight increase in the contribution of weetbix and milk powder to riboflavin as shown in Figure 10.5 contributed to the small increase observed for the nutrient density of riboflavin, particularly between 2001 and 2004. While the contribution of juice to vitamin C decreased over time as shown in Figure 10.4, the contribution of fruit drink and cordial to vitamin C increased slightly between 2001 and 2005. The contribution of fresh fruit to vitamin C increased between 2001 and 2004 and decreased again between 2004 and 2005. Table-salt contributed substantially to the increase in sodium observed over the three year periods, particularly between 2001 and 2004. The contribution of bread and canned corned beef to sodium availability decreased between 2001 and 2004 as shown in Figure 10.6. The contribution of flour to total folate decreased markedly between 2001 and
2004, while the contribution of weetbix increased as did fresh vegetables, particularly between 2004 and 2005 (Figure 10.7). An increase in the contribution of milk powder to calcium availability between 2001 and 2004, observed in Figure 10.2, contributed most to the increase in the nutrient density of calcium (Figure 10.8).

**Figure 10.3** Percent contribution of food items to β-carotene availability over three year periods, 2001, 2004 and 2005

**Figure 10.4** Percent contribution of food items to Vitamin C availability over three year periods, 2001, 2004 and 2005
Figure 10.5 Percent contribution of food items to Riboflavin availability over three year periods, 2001, 2004 and 2005

Figure 10.6 Percent contribution of food items to Sodium availability over three year periods, 2001, 2004 and 2005
Figure 10.7 Percent contribution of food items to total Folate availability over three year periods, 2001, 2004 and 2005

Figure 10.8 Percent contribution of food items to Calcium availability over three year periods, 2001, 2004 and 2005

Changes in contribution to total energy over time

Figure 10.9 shows that compared to 2001, the contribution to total energy for confectionery, fresh fruit, canned and fresh vegetables, margarine, milk powder, pies, and aerated added sugar drinks was greater in 2004 and 2005, and for flour, juice and bread was less in 2004 and 2005. The contribution of sugar to total energy decreased in 2004 compared to 2001 and increased again in 2005.
Figure 10.9 Contribution of individual foods to total Energy in 2004 and 2005 as a proportion of 2001

10.5.2. Developing Performance Indicators

Relationship of performance indicators to community level dietary concerns

An analysis of the nutritional composition of the community level dietary intake measured through turnover of foods sold through the community food outlets showed deficiencies in total folate, potassium, calcium, magnesium, zinc and fibre and an excess of sodium, and refined sugar (Chapter 5, Section 5.5.3). This nutrient profile corresponded with less than the recommended number of available serves required for the community population, of fruit and vegetables, calcium containing foods, and wholegrain cereals. Performance indicators were developed to monitor these key dietary areas in line with the Australian guidelines for healthy eating.
Determining performance indicators

Table 10.8 shows the performance indicators developed to provide quantifiable measures of trends in the nutritional quality of the food supply. The secondary performance indicators provide complementary data to the primary indicator.
Table 10.8 Primary and secondary performance indicators in relation to Australian Guidelines for Healthy eating

<table>
<thead>
<tr>
<th>Topic area</th>
<th>Primary Performance Indicator</th>
<th>Secondary Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat plenty of vegetables, legumes and fruit</td>
<td>Total weight of fruit sold over a specified time period</td>
<td>Percent that fruit contributes to total food sales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total weight of fresh fruit sold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proportion that fresh fruit contributes to total fruit weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total weight of vegetables sold over a specified time period¹</td>
<td>Percent that vegetables contribute to total food sales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total weight of fresh vegetables sold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proportion that fresh vegetables contributes to total vegetable weight</td>
</tr>
<tr>
<td>Eat plenty of cereals, preferably wholegrain</td>
<td>Proportion that wholegrain (and wholemeal) breads contribute to total bread weight</td>
<td>Percent that wholegrain breads contribute to total food sales</td>
</tr>
<tr>
<td>Include lean meat, fish, poultry &amp;/or alternatives</td>
<td>Number of lean meat cuts to total fresh meat cuts</td>
<td>Availability of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skinless chicken cuts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lean mince meat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steak with minimum fat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh fish</td>
</tr>
<tr>
<td>Include milks, yoghurts, cheeses and reduced fat</td>
<td>Total weight of full cream milk powder</td>
<td>Total volume of reduced fat liquid milk</td>
</tr>
<tr>
<td>varieties should be chosen where possible</td>
<td></td>
<td>Availability of reduced fat liquid milk and reduced fat milk powder</td>
</tr>
<tr>
<td>Limit saturated fat and moderate total fat intake</td>
<td>Proportion that canned corned beef contributes to total meat and meat product weight</td>
<td>Percent that canned corned beef contributes to total food sales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type of margarine and oil available</td>
</tr>
<tr>
<td>Consume only moderate amounts of sugar and sugary</td>
<td>Total weight of table sugar (raw and white sugar)</td>
<td>Percent that table sugar contributes to total food sales</td>
</tr>
<tr>
<td>foods</td>
<td>Total weight of confectionery</td>
<td>Percent of confectionery to food sales</td>
</tr>
<tr>
<td></td>
<td>Proportion of cold drinks total volume that is:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottled water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbonated sweet drinks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total volume of aerated added sugar drinks sold over specified period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total volume of bottled water</td>
<td></td>
</tr>
<tr>
<td>Choose foods low in salt</td>
<td>Total weight of salt sold over specified period</td>
<td>Percent that table salt contributes to total food sales</td>
</tr>
<tr>
<td>Take away food choices to:</td>
<td>Total weight of hot chips sold</td>
<td></td>
</tr>
<tr>
<td>- Limit saturated fat and moderate total fat intake</td>
<td>Total weight of pies sold</td>
<td>Availability of:</td>
</tr>
<tr>
<td>- Eat plenty of vegetables, legumes and fruit</td>
<td>Proportion of meal choices available in the take away outlet that are healthy food choices²</td>
<td>Sandwiches</td>
</tr>
<tr>
<td></td>
<td>Number of days in one week (7 days) that healthy food choices are available</td>
<td>Fruit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Salads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hot dish – meat and vegetables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boiled eggs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cobs of corn</td>
</tr>
</tbody>
</table>

¹Not including hot potato chips

²A healthy food choice is a prepared food that includes fruit or vegetables and is not deep fried.
Rationale for Performance Indicators

Figure 10.10 shows the relationship between: the outcomes stated in the policy documents, Eat well Australia, NATSINSAP and the NT Food and Nutrition Policy; the Australian Guide to Healthy Eating; and the main food groups and key foods contributing to the food group and nutrient availability as determined in Section 10.5.1. The rationale for each of the performance indicators based on the policy topics shown in Figure 10.10, is described in the following section using 2005 store data as analysed and presented in Chapter 5. As shown previously, (Section 10.5.1, p 313), both macro-nutrient availability and key foods contributing to macro- and micro-availability were relatively consistent across the three time periods.
Improved availability, variety quality and affordability of core foods

Increased consumption of specific core foods at recommended levels in remote communities

Eat plenty of vegetables, legumes and fruit

Fruit and vegetables
Fresh fruit and fresh vegetables

Eat plenty of cereals, preferably wholegrain

Cereal and cereal products
Bread, flour and weet-bix

Include lean meat, fish, poultry &/or alternatives

Meat and meat products
Chicken, steak, canned corned beef, egg

Include dairy. Reduced fat varieties should be chosen where possible

Milk and milk products
Full cream milk powder

Drink plenty of water

Beverages
Fruit juice, aerated added sugar drinks, cordial/fruit drinks, tea

Choose foods low in salt

Herbs and spices
Salt

Limit saturated fat and moderate total fat intake

Fats & oils, Milk & milk products, meat & meat products
Margarine, full cream milk powder, canned corned beef

Consume only moderate amounts of sugar and sugary foods

Sugar and aerated added sugar drinks
Beverages, sugar and confectionary

Figure 10.10 Key foods in relation to Australian Guidelines for healthy eating and policy outcomes
**Topic area 1: Eat plenty of vegetables, legumes and fruit**

Chapter 5, Section 5.5.6, showed that the number of serves of fruit and vegetables required for the community population was substantially lower than optimal. Increasing the consumption of fruit and vegetables is a national priority in improving the dietary intake of all Australians. Fresh fruit and vegetables contributed substantially to the total turnover of fruit and vegetables.

The Australian Guide to Healthy Eating contains recommendations for fruit and vegetables including fresh, canned or frozen varieties with less emphasis on juices and dried fruit and dried vegetables. The target is therefore to increase the total turnover of both fruit and vegetables and at least maintain or increase the current contribution of fresh produce to both fruit and vegetable turnover.

**Topic area 2: Eat plenty of cereals, preferably wholegrain**

The primary foods contributing to cereal and cereal products were flour and bread. These two foods were important sources of energy, protein, carbohydrate and fibre. Weetbix was an important source of fibre. White bread and flour and to a lesser extent weetbix were important sources of iron, total folate, zinc, thiamine, niacin and magnesium for each of the study periods. This was largely due to fortification. The bio-availability of these nutrients is highly dependent on other dietary and non-dietary variables. Obtaining these essential nutrients solely from fortified food products may therefore not be ideal.

The Australian Guidelines for Healthy Eating recommend that Australians eat plenty of cereals, preferably wholegrain cereals. Chapter 5, Section 5.5.6, showed that although cereal and cereal products contribute the greatest proportion to total energy availability, the number of serves of core cereal and cereal products (not including cereal-based foods such as cakes and biscuits) was less than required. At present, wholemeal and wholegrain breads are either not available or limited in remote Indigenous community stores. While not big sellers, a number of people in communities do request these products and purchase them when available. The target is to increase the proportion that wholegrain and wholemeal breads contribute.
to total bread weight and to ensure the availability of other wholegrain products such as rolled oats, weetbix and brown rice.

**Topic area 3: Include lean meat, fish, poultry and/or alternatives**

Meat, fish and poultry and their alternatives contribute a number of important nutrients, some of which were shown to be marginal in the community level diet, such as total folate, zinc and magnesium. Despite meat and meat products providing one-tenth of total dietary energy (Chapter 5, Section 5.5.4), approximately one-quarter of the iron and 40% of the zinc availability were derived from this food group. Canned corned beef, steak and chicken were valuable sources of protein, iron and zinc in the study community. In weight, canned corned beef contributed one tenth (11%) of the meat and meat product group. It contributed more to total fat than fresh meat cuts and was an important source of sodium.

The Australian Guidelines for Healthy Eating recommend that Australians include lean meat, fish, poultry and/or alternatives. The target is to reduce the turnover of canned beef whilst increasing the turnover of lean fresh meat cuts and to ensure the availability of skinless chicken cuts and canned and fresh fish.

**Topic area 4: Include milks, yoghurts, cheeses and reduced fat varieties should be chosen where possible**

Full cream milk powder contributed most to the milk and milk products food group (41%) and was a main source of saturated fat, protein and energy as well as an important source of dietary calcium, vitamin A, zinc, magnesium and riboflavin (Chapter 5, Section 5.5.4, Table 5.7, p 119 and Table 5.8, p 122). Chapter 5, Section 5.5.6, (p 125-127) in addition to showing that the community level diet was deficient in calcium, it showed that the number of serves of calcium containing core foods was less than required.

The Australian Guidelines for Healthy Eating recommend that Australians include milks, yoghurts, cheeses and/or alternatives and choose reduced fat varieties where possible. In 2005, milk foods contributed approximately one third to the total
community level saturated fat intake with full cream milk powder providing 22% of this. The target is to increase the turnover of milk powder and ensure the availability of reduced fat dairy products, particularly reduced fat milk powder. A secondary target is to increase the turnover of reduced fat liquid and powdered milk.

**Topic area 5: Limited saturated fat and moderate total fat intakes**

This topic area links with topic numbers 3, 4 and 9. Margarine contributed more than 80% to the total weight of fats and oils and 22% to total fat. In addition to margarine, full cream milk powder and take-away foods contributed most to total fat intake and saturated fat. Sweet biscuits were a moderate source of saturated fat. Total fat intake contributed around 22% of total energy with saturated fats contributing 8% of energy and polyunsaturated fats (PUFA) around 4% of energy. The recommended range for n-6 polyunsaturated fatty acids is between 6 to 8 per cent of energy. The percent that PUFA are contributing to total energy needs to be substantially increased.

The target is to reduce saturated fats through making available reduced fat milk powder (refer to topic 4), reducing sales of pies and deep fried chips (refer to topic 9), ensuring healthy meal alternatives in the take-away (refer to topic 9) and ensuring the availability of canola oil, canola margarine and fresh and canned fish (refer to topic 3).

**Topic area 6: Consume only moderate amounts of sugar and sugary food**

Chapter 5, Section 5.5.3, showed that the amount of sugar consumed at the community level is excessive. Refined sugars contributed approximately one-third of total energy intake. Table sugar, both raw and white sugar, contributed over 80% to the total weight of sugar and confectionery sold through the store, and provided 16% of total energy.

Reducing sugar consumption has been suggested as an important strategy to improve the health of Indigenous Australians\(^{257}\). The target is to decrease the amount of sugar sold through the store. A secondary target is to reduce the turnover of confectionery.
**Topic area 7: Drink plenty of water**

This topic relates to topic area 6. Beverages, including cordial, aerated added sugar drinks, fruit juice and fruit drinks provided approximately one-quarter of total sugar. Aerated added sugar drinks provided nearly half of this.

The Australian Guidelines to Healthy Eating recommend that all Australians drink plenty of water and consume only moderate amounts of sugars and foods containing added sugars. The target is to increase the contribution of water and decrease the contribution of aerated added sugar drinks to total beverage volume by increasing the turnover of bottled water and reducing the turnover of aerated added sugar drinks.

**Topic area 8: Choose foods low in salt**

In contrast to wider Australia where sodium in the diet comes mostly from processed foods, around 20% of sodium intake was provided by table salt alone. Discretionary salt use was an important source of sodium, more so than in wider Australia. Chapter 5, Section 5.5.3, showed that sodium was around three times more than the recommended levels for the community population.

Reducing dietary salt is potentially an important health strategy for the primary prevention of hypertension. The Australian Guidelines to Healthy Eating recommend that Australians choose foods low in salt. The target is to reduce the turnover of table salt.

**Topic area 9: Take-away food**

This topic area relates to topic areas 1 and 5. In the study community, hot take-away foods contributed 15% to total fat intake and 8% to total energy. Hot potato chips were an important source of saturated fat contributing 8% to community level availability of saturated fat (Chapter 5, Section 5.5.4). Chapter 7 and 9 reported that healthy alternatives to high fat pre-prepared foods were often not available in the community take-away. It is important that indicators be developed to provide a quantifiable measure of trends in the nutritional quality of take-away food outlets.
The target is to reduce the turnover of pies and hot chips and increase the availability of healthy food options.

**Determining baseline and targets for each performance indicator**

Table 10.9 shows the baseline and outcome target for each of the performance indicators. The baseline is for 2001. Outcome targets are presented as a quarterly and (weekly) quantity of the particular food item, or food group where relevant.
Table 10.9 Baseline and outcome target for each performance indicator

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>2001</th>
<th>2004</th>
<th>2005</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of fruit sold over the quarter (kg)</td>
<td>3253</td>
<td>4802</td>
<td>3007</td>
<td>6480/mth (1620/wk)</td>
</tr>
<tr>
<td>Total weight of fresh fruit sold over the quarter (kg)</td>
<td>2691</td>
<td>4073</td>
<td>2601</td>
<td>5600/mth (1400/wk)</td>
</tr>
<tr>
<td>Proportion of total fruit that is fresh fruit (%)</td>
<td>83</td>
<td>85</td>
<td>87</td>
<td>84</td>
</tr>
<tr>
<td>Percent of total food sales that is fruit (%)</td>
<td>-</td>
<td>3.5</td>
<td>2.4</td>
<td>13</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of vegetables sold over the quarter (kg)</td>
<td>5589</td>
<td>5690</td>
<td>8732</td>
<td>10 880/mth (2720/wk)</td>
</tr>
<tr>
<td>Total weight of fresh vegetables sold over the quarter (kg)</td>
<td>3550</td>
<td>3830</td>
<td>6427</td>
<td>8 080/mth (2020/wk)</td>
</tr>
<tr>
<td>Proportion of total vegetables that is fresh vegetables (%)</td>
<td>63</td>
<td>62</td>
<td>71</td>
<td>75</td>
</tr>
<tr>
<td>Percent of total food sales that is vegetables (%)</td>
<td>-</td>
<td>4.4</td>
<td>5.3</td>
<td>14</td>
</tr>
<tr>
<td><strong>Cereal and cereal products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion that wholegrain bread contributes to total bread weight (%)</td>
<td>4.9</td>
<td>5.1</td>
<td>4.2</td>
<td>10</td>
</tr>
<tr>
<td>Proportion that wholegrain bread contributes to total food sales (%)</td>
<td>-</td>
<td>0.6</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Meat and meat products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of lean meat cuts to total meat cuts</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Availability of skinless chicken cuts</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of lean mince meat</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of lean meat cuts</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of steak with minimum fat</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of fresh fish</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of canned fish</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Milk and milk products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of full cream milk powder (kg)</td>
<td>3066</td>
<td>3152</td>
<td>3373</td>
<td>1724/mth (431/litre/wk)</td>
</tr>
<tr>
<td>Availability of reduced fat milk powder</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Total weight of reduced fat liquid milk (kg)</td>
<td>94</td>
<td>101</td>
<td>513</td>
<td>1760/mth (490/litre/wk)</td>
</tr>
<tr>
<td><strong>Fats &amp; oils</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion that canned corned beef contributes to total weight of meat products (%)</td>
<td>17</td>
<td>14</td>
<td>11</td>
<td>6.2</td>
</tr>
<tr>
<td>Proportion that canned corned beef contributes to total food sales (%)</td>
<td>N/A</td>
<td>4.1</td>
<td>3.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Availability of canola margarine</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of canola oil</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Availability of olive oil</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Sugar and confectionery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of brown, raw and white sugar combined (kg)</td>
<td>11 976</td>
<td>8 881</td>
<td>11513</td>
<td>1920/mth (480/wk)</td>
</tr>
<tr>
<td>Proportion that brown, raw and white sugar contributes to total food sales (%)</td>
<td>N/A</td>
<td>2.4</td>
<td>3.7</td>
<td>1.6</td>
</tr>
<tr>
<td>Total weight of confectionery (kg)</td>
<td>422.7</td>
<td>798.0</td>
<td>818.3</td>
<td>248/mth (62/wk)</td>
</tr>
<tr>
<td><strong>Beverages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion that bottled water contributes to total beverages (%)</td>
<td>0.8</td>
<td>1.7</td>
<td>2.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Proportion that aerated added sugar drinks contribute to total beverages (%)</td>
<td>67</td>
<td>67</td>
<td>64</td>
<td>46</td>
</tr>
<tr>
<td>Total volume of bottled water (l)</td>
<td>240</td>
<td>618</td>
<td>955.8</td>
<td></td>
</tr>
<tr>
<td>Total volume of aerated added sugar drinks (l)</td>
<td>20 329</td>
<td>23 568</td>
<td>23 651</td>
<td>3940/mth (985/litre/wk)</td>
</tr>
<tr>
<td><strong>Salt</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of salt (kg)</td>
<td>106.5</td>
<td>173</td>
<td>151</td>
<td>25.2/mth (6.3/wk)</td>
</tr>
<tr>
<td>Proportion that salt contributes to total food sales (%)</td>
<td>N/A</td>
<td>0.1</td>
<td>0.1</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Take away food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total weight of hot chips sold over the quarter (kg)</td>
<td>-</td>
<td>468</td>
<td>271</td>
<td>46/mth (11.5/wk)</td>
</tr>
<tr>
<td>Total weight of pies sold over the quarter (kg)</td>
<td>580</td>
<td>816</td>
<td>734</td>
<td>120 (30/wk)</td>
</tr>
<tr>
<td>Proportion of meal choices available in the take away outlet that are healthy food choices</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number of days in one week (7 days) that at least healthy food choices are available</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
10.5.3. Applying the performance indicators

**Trends in performance indicators in relation to changes in nutrient availability**

From the data presented in Section 10.5.1 (p 312-323) in relation to food items contributing to changes observed in nutrient density and availability over time, an upward shift in the indicators relating to fruit, vegetables, soft drinks, table salt, milk powder, margarine and pies would be expected, between 2001 and 2004, together with a downward shift in the indicators relating to bread and canned corned beef. Between 2004 and 2005, a marked upward shift in vegetables would be expected with a downward shift in fruit, milk powder, salt and canned corned beef. These shifts were reflected by the performance indicators as shown in Table 10.9.

Upward and downward trends in the store food supply over the three time periods, 2001, 2004 and 2005 are clearly evident on applying the performance indicators as shown in Table 10.9. The most marked positive changes are evident between 2001 and 2004; fruit turnover increased by 48%, the proportion of wholegrain bread to total bread availability increased slightly, the turnover of bottled water increased and the turnover of sugar decreased by one-quarter. Canola oil and canola margarine were made available for sale after 2001.

However many of these improvements were not sustained between 2004 and 2005; the increase in fruit observed between 2001 and 2004 decreased in 2005; the proportion of wholegrain bread to total bread availability decreased further from the 2001 baseline, and the turnover of sugar increased to near the baseline level.

The turnover of aerated added sugar drinks increased slightly between 2001 and 2004 as did the proportion of canned corned beef to total meat availability. The reduction in sugar turnover observed between 2001 and 2004 occurred with a concomitant near doubling of confectionery turnover.

Positive changes observed between 2004 and 2005 were for vegetables where turnover increased by 53% and fresh vegetable turnover alone increased by 68%. There was also a slight increase in the turnover of milk powder, a marked increase in
the turnover of reduced fat liquid milk where turnover quadrupled, further increase in
the turnover of water, a slight decrease in turnover of salt and pies, a marked
reduction in turnover of hot chips, by 42%, and the addition of fresh fish as a grocery
line.

**Timeliness in monitoring**

Figure 10.11 and Figure 10.12 illustrate differences in the reporting of fresh fruit and
vegetable turnover over time. Figure 10.11 shows monthly reporting of the turnover
of fresh fruit and vegetable over a 13 month period between March 2004 and March
2005, whereas Figure 10.12 shows quarterly turnover data. Annual reporting as
shown in Table 10.9, showed an increase in vegetable turnover between 2004 and
2005, but failed to capture the static turnover of vegetable turnover observed over the
2\(^{nd}\) and 3\(^{rd}\) quarter as shown in Figure 10.12. Similarly the annual data for fruit
turnover, as shown in Table 10.9, showed a marked decrease in fresh fruit turnover
between 2004 and 2005, but failed to capture the upward trend in fresh fruit turnover
shown in Figure 10.12, immediately prior to the annual data collection period.

![Figure 10.11 Fresh fruit and vegetable trend over time, by month](image-url)
10.6. Discussion

The performance tool presented in this chapter has utility at both the community and government levels to monitor the nutritional quality of the food supply in remote Aboriginal communities and to provide feedback to inform timely decision making. While it would be tempting to consider these performance indicators relevant to other remote Aboriginal communities, where a similar dietary pattern has previously been shown\(^8\), the transferability of these indicators needs to be determined. This chapter however outlines the steps required in developing such indicators based on point-of-sale store level data. It demonstrates that in the context where a limited number of key foods contribute to overall dietary intake, a simple monitoring tool has the capacity to detect dietary change that is consistent with changes in nutritional composition. It has also shown that for each performance indicator a measurable outcome target can be calculated based on the recommended diet for all Australians and the community population distribution. This provides an important guide for store managers and other key stakeholders to set intermediary targets and plan for improvement. Although store managers are continually encouraged by health professionals to increase the availability of certain food products, there are no established targets for remote community stores beyond the broad statement...
contained within the NT Food and Nutrition policy, of increasing core foods to recommended levels.

The establishment of a monitoring system that is based on indicator foods rather than nutrients focuses store managers and other key stakeholder’s attention on the foods that need modifying to improve nutrition. I have shown the responsiveness of the performance indicators to detect changes that reflect nutrient availability and the contribution of specific foods to macro- and micro-nutrient availability over time. Indeed data based on nutrient composition is fast becoming meaningless as nutrient analysis relies on an out of date food composition database. Rapid changes occurring in food composition due to fortification and other modifications challenge the capacity of food composition databases to remain relevant.

The development, implementation and maintenance of such a monitoring system are critical to improving the nutritional health of Aboriginal people living in remote communities. As noted previously there is no system in operation that provides objective data on the nutritional quality of the food supply in remote Aboriginal communities. Policy and strategy development and decision making are therefore occurring in a data vacuum. This has facilitated a culture of no accountability and “blaming” at all levels and yet, it is widely recognised that poor nutrition contributes substantially to the poor health and well-being of Aboriginal people. Without any objective measure of change in the nutritional quality of the food supply in remote communities, improvement relies on subjective measures of individual people providing feedback and advice to store managers. As demonstrated in the previous chapter, this is often counter-productive and invariably results in strained relations between the store manager and well-intentioned individuals, and a situation of no change, or conversely, elicits a quick “fix it” response which is not maintained.

Both store management and key community people have been shown to be critical to achieving and sustaining positive change in the nutritional quality of the food available through remote community stores\textsuperscript{127}. The position of the store manager in influencing the quality of the food supply was detailed in the previous chapter. As proposed in the previous chapter and shown in Figure 9.1, a participatory, collaborative process with relevant stakeholders is important to the effective
implementation of this performance tool. The strength of this tool is that it does not require the input of external evaluators and has been designed purposely for use at the community level. Key to the effectiveness of this tool at the community level is the active involvement of store and food outlet managers, community councils and other key stake-holders in determining and monitoring interventions to improve the nutritional quality of the food supply.

Section 10.5.3 (p 335-336) indicated that quarterly rather than monthly or annual monitoring would provide more useful data on trends in the food supply to allow a reliable assessment of progress and timely decisions to be made. To minimise the time and effort required to generate the data on performance indicators, there is potential with electronically available point of sale data to develop an automated reporting system. Data could be extracted from the store database and reloaded into a standardised relational database that categorises the data by food group according to the food item’s unique identifier (barcode). Data could then be analysed and a simple pictographic report prepared. Alternatively, relevant food categories could be set up on the store point of sale system and a data report generated quarterly.

Ongoing quarterly data collected on the performance indicators can be used to measure the impact of interventions, to inform the development of strategies and policies and to inform resource allocation. This continuing effort to achieve better results is informed by Continuous Quality Improvement (CQI) theory.

As with other organisations, the store is a system made up of many different interconnecting parts that relate to the system domains shown in Figure 9.1 and discussed in Chapter 9. Chapter 9 demonstrated how these components can impact significantly on the nutritional quality of the food supply. In addition to monitoring trends in the food supply, a monitoring tool could assist in determining system components contributing to observed up- or down-ward trends. For example, the capacity to link an upward trend in fresh fruit turnover with workforce training or improved infrastructure would assist in planning for further improvement. Similarly, identifying inadequate infrastructure as contributing to the failure to improve turnover of fresh produce would also assist in planning and decision-making in relation to nutrition improvement.
The benefit of using performance indicators for nutritional improvement in a capacity building and CQI framework is that nutritional improvement and good business practice are inextricably linked. While achieving nutritional outcomes may not be the focus of store management, achieving good business practice generally is. This approach to improving the quality of the food supply also provides a framework for people external to the store with interest in the nutritional quality of the food supply, such as community leaders, and health professionals, to work within. It offers a more systematic and comprehensive approach to nutritional improvement than what is presently practiced.

The transferability of the performance indicators to other stores in remote Australia needs to be evaluated. A monitoring tool based on this research is currently being developed as part of the RIST project in association with ALPA and the “Outback Stores” Indigenous Business Australia initiative. This tool will have the capacity to be applied across all stores in remote Australia.
Conclusion
Chapter 11. Conclusion and future directions: Rations and a little bit extra

Through applying the PRECEDE assessment phases of the PRECEDE-PROCEED model, this research has described significant historical, social, cultural, environmental and economic factors influencing the diet and eating behaviour of Aboriginal people in a remote community in north-east Arnhem Land and challenging nutrition improvement. The aim of this concluding chapter is to synthesise the findings of each of the assessment phases to address the research questions and comment on implications for policy, practice and research.

11.1. Key findings

The research framework provided a model within a systems/social-ecological paradigm to view factors influencing behaviour in relation to diet and eating behaviour, and thereby challenging nutrition improvement. Each study component provided a means to answering the primary research question which was: What historical, social, cultural, economic and environmental factors underlie the current diet and eating behaviour of Aboriginal people living in a remote community in the NT and challenge nutrition improvement? The framework fits with the holistic way of viewing nutrition and eating behaviour held by Yolngu and reported in Chapter 7.

An approach to addressing nutrition that does not include consideration of contextual factors is likely to be viewed by Aboriginal people as irrelevant and thus inappropriate. Figure 11.1 depicts the key findings of this study in relation to the four assessment phases of the research framework.
Figure 11.1 A summary of the key findings in accordance with the four assessment phases of the research framework
As shown in Figure 11.1, the epidemiological assessment confirmed that type 2 diabetes was a problem for the study community and was strongly linked with age and overweight and obesity. Excess weight gain among young people was identified as a modifiable risk factor to prevent type 2 diabetes. The behavioural and environmental assessment reported an adverse dietary profile consistent with a high prevalence of type 2 diabetes and related conditions and identified access to healthy food and poverty as key determinants of food choice. The educational and ecological assessment suggested that nutrition improvement efforts need to consider broader-based determinants such as employment, housing, the availability and cost of food, and illicit substance use. The administration and policy assessment found the community store as a critical intervention point for increasing the availability of healthy food choices. To achieve this, a framework was proposed based on a collaborative “whole-of-store” approach that integrates feed-back using a simple monitoring tool based on indicator foods and food groups, into a cyclic improvement model.

This research has shown that the factors underlying current nutrition behaviour are multiple and complex and exist at an individual, interpersonal, organisational and societal level, as shown in Figure 11.1. In the study community, satisfying hunger and meeting social demands, both traditional and western-imposed, were found to be key drivers of food choice and considerations of nutritional quality less so. Poor dietary practices are both maintained by environmental influences and learned, and thus become normative behaviour. Intervention therefore requires both creating a supportive environment and modifying social norms. A review of the international literature, reported in Chapter 2, Section 2.7, showed that a good understanding of the community is needed to develop appropriate approaches as there is no one size that fits all. The PRECEDE-PROCEED model used in this research provides a framework to understand the local context and the barriers that need to be addressed to develop appropriate intervention strategies. However, the comprehensiveness of the model and time required to systematically work through each of the assessment phases may limit its application outside of research.

At the individual level, taste, cost, habit, familiarity, convenience and expression of personal autonomy were found to be important factors driving food choice. People
in general demonstrated knowledge of health promoting foods and the constituents of a healthy diet, and understood the relationship between food and health. Young people showed a preference for traditional foods and fresh fruit as did people in the wider community. Despite these food preferences and a general awareness of good eating practices, a number of inter-related physical and social factors were identified that constrained people’s food choices and were found to be significant determinants of nutrition behaviour. The physical factors related to the availability and cost of food, adequate housing and the functionality of household hardware. The social factors related to the demands placed on some family units from easy access to illicit substances, overcrowding, and the reinforcement of certain eating behaviours associated with ensuring cultural integrity while guaranteeing food sustenance. The key determinant underpinning nutrition behaviour however was found to be poverty. The reliance on relatively lower cost, high energy foods as shown in Chapter 5, Section 5.5.8 (p 130) and Chapter 7, Section 7.4.2, (p 205-217) within the context of poverty, supports the economics of food choice theory by Drewnowski and Specter\textsuperscript{261}.

These factors challenge nutrition improvement and the development of effective and appropriate strategies to address poor nutrition and prevent type 2 diabetes and related conditions such as renal disease and cardiovascular disease. The literature reviewed in Chapter 2 showed that improvements in the nutritional quality of the food supply can occur through store-based intervention. Examination of the facilitators and barriers to improving the nutritional quality of the food supply indicated that a systems-based comprehensive approach to building store organizational capacity is required to support and maintain effort for nutrition improvement. That poverty is a key determinant of nutrition behaviour suggests however that focusing on store level change without addressing the broader underlying issues, will only have a limited impact in the long term. Nevertheless, considering the current constraints of availability and cost on food choice, intervening at the store level at this stage, is critical.

The National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan\textsuperscript{37} describes an intersectoral approach to improving the nutritional health of Indigenous Australians. However, there is no framework for implementation of a
comprehensive approach to improve nutritional health at the community level. Whether due to inadequate resources or lack of government commitment to working intersectorally, nutrition intervention at the community level is largely ad hoc, reactive and opportunistic and assumes a deficit in people’s food and nutrition knowledge base.

A number of issues have been identified that need to be considered in order to improve nutrition. Of primary importance to community members in improving nutrition is the place of traditional foods. A key finding of this research that has received little attention in relation to nutrition and nutrition behaviour is that of cultural identity. That the Yolngu food system is inextricably linked with cultural identity, and that the reliance on traditional food is diminishing, is central to understanding poor nutrition and developing appropriate approaches for nutrition improvement. Current approaches to nutrition improvement that are based solely on the western food system and are directed at individual level behaviour are not appropriate within a systems/socio-ecological framework. Traditional foods are central to maintaining cultural health and well-being and therefore nutritional health. Their significance in relation to health has been undervalued. Traditional foods provide a potentially rich resource base for economic development for Yolngu, central to improved nutritional health. Secondly, the traditional food system provides a reference point for learning about the Balanda food system. Thirdly, traditional foods within Yolngu culture provide a means to guide and influence behaviour.

A further issue that needs to be considered is that in the present study context, people’s knowledge of health promoting foods and the relationship between food and health was generally good. There were some gaps however. People thought of food as belonging to a food system. It was the non-Aboriginal food system rather than individual foods that people believed they did not adequately understand. For instance, people believed they were not adequately aware of such aspects as the origins of non-Aboriginal food, the process of manufacturing foods, the system of use-by-dates, and consumer rights. In this respect, people understood their traditional food system: they did not understand the non-Aboriginal food system.
11.1.1. Secondary research questions:

To examine the factors influencing the diet and eating behaviour and nutrition improvement for Aboriginal people in remote communities this research focused on one community with the aim of gaining insight from the perspective of Aboriginal people.

The first research question sought to answer, so as to guide the direction of the research and to contribute to answering the principal research question: What is the magnitude of type 2 diabetes and related conditions including poor diet, among the study population?

The epidemiological, behavioural and environmental assessment phases of the research found a 12 percent prevalence of type 2 diabetes in spite of almost half (47.3%) of the study population being lean (BMI<22kg/m^2). Those with the lowest type 2 diabetes profile were lean and/or young. There was a very rapid period of weight gain between the age-groups, 25-34 yrs and 35-44 yrs. This was consistent with no type 2 diabetes observed among those less than 30 years of age and a prevalence of 47.2% among those 45 to 54 years. Relative to being lean, there was a trend (not quite significant) to increased risk of diabetes with even modest levels of overweight (BMI 22-<25kg/m^2) (age-adjusted odds ratio=4.1, 95% CI 0.9-17.7, p=0.06). Overweight or obesity however conferred a large excess odds (age-adjusted OR=24.1, 95% CI 6.0-96.5, p<0.001) relative to being lean.

This research phase identified young people as an important target group to prevent the onset of type 2 diabetes. Important differences in dietary patterns were observed between younger and older aged people that have important implications for nutrition intervention and prevention of type 2 diabetes and related conditions. Over half of the study population reported to consume fruit and vegetables only once a week or less. However, those less than 35 years of age reported to eat fruit and vegetables less frequently than those over 35 years and take-away food more frequently. Nearly one-third of young people (<35 yrs) reported to consume take-away food 4 to 6 times
per week. While the prevalence of type 2 diabetes and overweight and obesity peaked in the middle aged group, the lower prevalence of diabetes and overweight and obesity observed in those over 55 years of age is consistent with a protective role of traditional foods in those that survived into old age. These reported differences in dietary intake between age-groups were not examined further. Instead, an assessment of the diet available to people at the community level was conducted to identify adequacies and deficiencies in dietary intake.

An important finding was that the purchased food supply closely resembled that reported by Lee et al^8^ nearly two decades earlier in the late 1980s: high in refined carbohydrates, mainly flour, bread and sugar; and low in fruit and vegetables, and was not unlike the diet prescribed in the government ration scale in use on missions and government settlements in the NT in the 1950s. The community level dietary profile reported by this research was found to resemble that of other low income populations in developed countries both in Australia and overseas. Among the study population, sugar has displaced fruit and vegetables as an important energy source. Where fruit contributed 1% to total energy intake, sugar as table sugar, contributed 16.3%. Unlike wider Australia, where sugar is consumed in a composite form in biscuits, cakes and pastries, in the study community, sugar was shown to be consumed as sugar per se. Table sugar, bread and flour combined, contributed 40.6% of the total energy available through the community food supply. These foods also provided the cheapest calories.

Focusing on improving the nutritional quality of the available diet through mainly increasing the availability of fruit and vegetables, this research has shown that a further 20% of household income would be required. The proportion of household income expended on food and non-alcoholic beverages could not be estimated for the study population. Based on data available for non-remote NT however, it is likely that the current proportion of household income expended on food and non-alcoholic beverages is higher than 50%, compared to 12% for all households in non-remote NT. It was unanimously recognised by people in the study community that financial constraints and related issues limited people’s consumption of fruit and vegetables, even though fruit and vegetables available through the community store attract a freight subsidy and are reasonably priced.
Having confirmed a high prevalence of type 2 diabetes and an adverse dietary profile, a further research question was: To what extent have past approaches to nutrition improvement impacted on current dietary behaviour of Aboriginal people in the study community? In answering this question an extensive review of archival documents and related literature was undertaken to explore possible relationships between past approaches to nutrition improvement and current dietary behaviour. This historical analysis of past approaches was considered pertinent considering the history of direct government intervention to assimilate the eating behaviour of Aboriginal people to that of Anglo Celtic Australian society. This investigation contributed to Phase 3, the ecological and educational assessment, of the research model.

A number of issues emerged from phase 3, that need to be considered in developing strategies for nutrition improvement. Firstly, past and current approaches to nutrition improvement need to be considered against a history of contradictions in relation to government policy relevant to Aboriginal Australians. Foremost is the contradiction of excessive control over the welfare of Aboriginal people on the one hand, and government indifference on the other, that has underpinned government policy directives since European settlement. The present manifestation of this is policy existing without supporting government commitment and adequate resources for its implementation. Since the assimilation era, non-Aboriginal administrators have intervened to control the food supply available to Aboriginal people. History has shown that with active government intervention to influence dietary behaviour, the health of Aboriginal people residing on missions and government settlements continued to deteriorate while housing and sanitation were inadequate. Knowledge and recognition of past contradictions indicate the need for a participatory and comprehensive approach to nutrition improvement.

Secondly, whilst the lives of Aboriginal people through the eras of protection to self determination (1870s to 1970s) were irrevocably affected, this research provides evidence that the people of the study community, throughout their history of colonisation, continued to rely on traditional foods to a significant extent, and in so doing maintained some responsibility for their nutritional needs and those of their children. In the case of the study community, perpetuation of the theory of “loss of
responsibility for children” serves to divert attention from a history of government negligence and continues to disempower Aboriginal people.

Thirdly, within the constraints of government and mission control, threaded through government reports and mission commentaries are accounts of Aboriginal actions that continually caused non-Aboriginal authorities to reassess their strategies and position regarding the welfare and rights of Aboriginal people. Aboriginal people are still seeking approaches that ensure cultural integrity and are not victim-blaming yet position Aboriginal people as central to decision-making concerning their welfare.

Lastly, past government recommendations regarding diet and feeding practices raise the question whether current dietary recommendations carry any credibility with Aboriginal people whose law concerning food and diet is steadfast. In the past where sugar was considered by government as an essential ration, it is now condemned by health professionals. Where early weaning of infants was recommended, prolonged breastfeeding is now promoted. Where a butter ration was encouraged due to concern for inadequate dietary intake of vitamin A, current advice is to reduce fat intake. Nutrition education efforts that continue to occur, largely assume a knowledge deficit in relation to food and nutrition. Often a set of food and nutrition rules are imposed without recognition of lay perspectives of food and nutrition and the potential conflicts or likenesses with traditional understandings of food and nutrition.

To provide a different lens through which to examine the primary research question, a further research question was: From the perspective of Aboriginal people, what factors influence nutrition and nutrition improvement? This investigation provided further assessment required for Phase 3 of the research framework.

This research, reported in Chapter 7 and Chapter 8, identified two key factors influencing nutrition and nutrition improvement from the perspective of Aboriginal people: 1) poverty, and; 2) a diminishing reliance on the traditional food system.
The findings of this research phase supported the findings of phase 2 that the community dietary profile resembled that of other low income populations. A number of lines of evidence that emerged from this research strongly indicated that economic constraints undermine dietary choices of Aboriginal people in the study community. These included, high levels of poverty among Indigenous Australians in general, the similarity of the dietary pattern to that reported for other low income groups, and the high cost of food and reliance on energy dense low cost foods. Further supporting this evidence was the perception of study participants reported in Chapter 4 and noted previously, of financial constraints hindering fruit and vegetable consumption.

Knowledge of healthy eating is constrained by social and economic circumstances as well as by structural constraints. The link between low income and high food cost is further complicated by overcrowding, inadequate household infrastructure, a young population distribution, and inequitable distribution of responsibilities within households. Unavoidable expenses that promote social cohesion and cultural integrity such as travel and mobile phones contribute to the financial burden on households. Excessive use of illicit drugs contributes to social disintegration rather than social cohesion and places enormous economic and social stressors on family units.

As occurred during the era of control and assimilation (1940s to 1970s) with inadequate resources to ensure adequate nutrition for Aboriginal people residing on the Elcho Island mission, access to traditional foods and Yolngu social structures and norms of reciprocity are attempting to provide a social welfare system to partly address food insecurity. It is socially accepted that people move between related household units for meals. Social networks however are essentially welfare-based and can be easily overburdened with demands that cannot be met. Sole female parents and children are particularly vulnerable. Accessing traditional food is also becoming increasingly problematic. Population pressures are placing demands on traditional foods available in the immediate surrounds of the community. Increasingly people are requiring access to a vehicle or boat to benefit from the natural resources.
Throughout the government era of control and assimilation to current government intervention Aboriginal people have acted to retain their traditional food supply and to seek a balance between the traditional and introduced food systems. Increasing disregard of the traditional food system with a history of government negligence of this natural resource available to Aboriginal people underlays deep social and cultural concerns that relate to health and nutrition. There is little promotion of traditional foods nor incorporation of traditional foods in nutrition education. In addition there is little attention being given to developing traditional foods as a resource for economic development.

Inclusion of the traditional food system as a fundamental structure of the school education curriculum has been proposed by a group of Yolngu educators. This could serve to enhance cultural well-being through acknowledgement and valuing of the Yolngu structures of education and health.

Approaches to nutrition improvement that are based solely on the western food system and are directed at individual level behaviour without addressing other levels of influence do not fit with a systems/socio-ecological framework nor with a Yolngu perspective of nutrition. Such approaches may serve to heighten expression of personal autonomy and resistance to so called “expert” advice.

The final two research questions completed the assessments necessary for Phase 4 of the PRECEDE-PROCEED model, concerning administrative, organisational and policy aspects: How do store practices influence the nutritional quality of the food supply? And what approaches may be appropriate to support nutrition improvement in remote community stores?

The community-wide interventions to improve nutrition and reduce the risk of preventable chronic disease, described in a review of the literature (Chapter 2, Section 2.7.2), identified the community store and/or food establishments as critical settings to focus change for nutrition improvement. All community-based interventions reviewed that were conducted in remote Aboriginal communities, impacted positively on the nutritional quality of the food supply and particularly on fruit and sugar sales. The process of how this was achieved suggested the presence
of a number of enabling factors: a) creating collaborations and partnerships with food vendors; b) influencing social norms and mobilising the community through community-wide education strategies; c) establishing and nurturing community support and commitment to the change process; d) steadily strengthening the capacity of key community people to take more responsibility in initiating and leading the change process; and e) attention to providing ongoing feedback of the change process to foster community support.

This research identified five key themes associated with a set of barriers, facilitators and challenges to the implementation of practices to improve the nutritional quality of the study community store’s food supply: a) store governance and the power of the store manager; b) workforce development and training; c) adequate infrastructure; d) negotiating a partnership between profit and health; and e) the role of feedback. The facilitators comprised competent management and supportive organisational procedures and policies, infrastructural improvements, and appropriate workforce development and training. A key challenge to improving the nutritional quality of the store food supply was negotiating a partnership between profit and health at the organisational level. Two underlying constructs salient to the implementation of practices to improve the store food supply were the importance of relationships and the role of feedback.

The link between nutritional outcomes and organisational change in addition to a high turnover of store managers, nutritionists and other key personnel highlighted the need for a strategic and comprehensive approach to support improved nutritional outcomes at the store level. A simple model was proposed to guide an approach to improve the nutritional quality of the food supply. The five key themes described above, were found to fit within the broad constructs that make up the NSW capacity building framework. A CQI process was included as a necessary feature of the capacity building framework to promote participation of Aboriginal people in implementing change for nutrition improvement, to foster collaboration and avoid blaming approaches, to ensure incremental improvements in the nutritional quality of the food supply, and to incorporate feedback in a constructive and ongoing process of improvement. The Guidelines for Ethical Conduct in Aboriginal and Torres Strait
Islander Health Research\textsuperscript{65} and the principles of participatory research underpin the processes of the capacity building framework.

In the situation where the competitive market does not exist to regulate the standard of remote community stores and other food outlets, government leadership is required to ensure an equitable service and to prevent adverse outcomes on health. This research demonstrated that relatively simple indicators based on key foods/food groups could detect negative or positive changes in the nutritional quality of the food supply. Monitoring of these indicators at the store and government level could help to inform policy development and implementation to improve access to nutritious foods for Aboriginal people in remote communities.

11.2. Strengths and limitations of the study

Multiple study approaches were used to address the primary research question with both historical and contemporary influences on nutrition behaviour and nutrition improvement examined. This multi-pronged approach enabled the primary research question to be viewed from different perspectives and for the data captured through one perspective to be compared, contrasted and/or enriched against another perspective. Without over-burdening the community through extensive querying and observation, this approach provided an in-depth and comprehensive analysis of the primary and secondary research questions. Constructing the research design based on a theoretical foundation provided a systematic framework to guide a comprehensive examination of influencing factors.

The use of both qualitative and quantitative data collection and analysis enriched the findings and facilitated the exploration of key emerging constructs in detail. For example, the construct of poverty was examined qualitatively from the perspective of Aboriginal people and quantitatively through an analysis of the available diet and associated cost.

Prolonged engagement in the field with established relationships based on trust and respect enabled the perspectives of Aboriginal people to be explored alongside my
observations and interpretations. The input of community members in guiding the development and use of culturally appropriate research methods maximised people’s participation and enabled a cross-section of views to be collected. Having established relationships in the community also enabled information and interpretations to be continually collected during the data collection process resulting in confidence that the research findings reflected a relatively accurate presentation of the issues.

This study has several limitations. English is spoken as a fourth or fifth language in the study community. While I endeavoured to learn Yolngu matha and completed a University level language course during the course of this research, my inability to converse fluently in Yolngu matha limited my ability to probe more deeply into issues discussed in language. The employment of a co-researcher at various stages of the research helped to deal with this limitation. All focus groups and interviews were audio-taped, transcribed, translated and discussed with the co-researcher and/or other research assistants which helped to overcome language constraints.

The data collected for this research revealed cases (“positive deviants”) where individuals or households had managed to put household systems in place to deal with the cultural pressures of demand sharing to ensure food security and the retaining of cooking utensils for food preparation. While the views of these people were incorporated into the analysis and contrasted and compared against other data collected, resources and time did not allow for a more indepth analysis of these cases.

Traditional foods contribute culturally, physically, spiritually, economically and physically to people’s well-being. It was beyond the scope of this thesis to determine the contribution of traditional foods to people’s dietary intake. Intrusive measurements of individual behaviour were avoided. Conclusions regarding dietary intake need to be considered in light of this limitation. However, while traditional foods are important, the apparent daily energy intake based on the population estimate, approximated that of wider Australia reported in the 1995 NNS (Table 5.9, p 124). This suggests that traditional foods provide a supplement to people’s diets rather than contributing substantially to energy intake and/or that traditional foods are unevenly distributed and contribute a larger proportion to diets in some
households compared to others. The amount of traditional food consumed in the community is also limited by time and access to a vehicle and money for fuel, skilled and motivated hunters in the family. Week-ends were observed to be a popular time for some families to go hunting.

The focus on a single community limits the generalisability of the knowledge gained from this research to other contexts. The aim of this research, however, was not to generalise to other communities but to gain a more detailed understanding of factors influencing nutrition from the perspective of Aboriginal people. This was achieved. The similarities and differences of the findings of this research to other remote settings reinforce the position that there is “no one size (approach) that fits all and that a comprehensive understanding of the community context is needed when developing and implementing nutrition interventions. Nevertheless, the implications arising from the study of this one community have strong relevance for other remote Aboriginal communities. The PRECEDE-PROCEED model provided a sound framework on which to guide a comprehensive assessment and from which there are key learnings.

11.3. Significance of research

Achieving adequate nutrition poses a problem for Aboriginal people living in remote Australia. Associated with poor nutrition is a high prevalence of type 2 diabetes and other related conditions such as overweight and obesity, cardiovascular disease, renal disease and cancers. As discussed in Chapter 1 (p 2) these diseases are contributing significantly to the much lower life expectancy relative to the overall Australian population1.

We found that leanness protected against type 2 diabetes across all age-groups (15 yrs and over) in the study community. An understanding of the factors influencing the diet and nutrition behaviour of Aboriginal people is therefore required to determine and develop appropriate and effective approaches to nutrition improvement so as to prevent high morbidity and mortality related to type 2 diabetes. Nutrition-related policy at the national and territory level recognises the broader
influences underlying nutrition. This research expands understanding of these influences and adds to the literature in 5 major areas:

Firstly, Aboriginal people view nutrition behaviour from a systems/socio-ecological perspective which is consistent with the approach taken to this thesis.

Secondly, this research confirms the findings of ethnographic studies across a number of remote Aboriginal communities, that poverty is a key determinant of food choice and eating behaviour. This research showed that the general dietary profile of Aboriginal people in the study community was similar to that reported among other low income populations in Australia and overseas as are other documented nutrition-related behaviours such as the feast/famine cycle. The demonstration of this association in other low income populations has implications for policy and practice. In de-emphasising differences between Aboriginal people and other low income populations, this research brings poverty to the forefront and frames behaviours such as that associated with the feast/famine cycle in an economic framework rather than a cultural one. Furthermore these results shows that the cultural practice of reciprocity may indeed be acting as a partial social security system and that without it, food insecurity with hunger may be more extensive. Use of illicit drugs however is stretching the social security system within some family units beyond its capacity to cope.

Thirdly, through exploring Aboriginal people’s perspectives on food and nutrition, this research has shown that the Aboriginal people from the study community view food as belonging to a holistic system and representing a Yolngu epistemology. In line with this way of perceiving food, there are a number of issues that emerged from this research that need to be accounted for in nutrition education. Proximal factors rather than factors associated with health in the future were identified by young people as being important drivers of food choice such as taste, affordability and convenience. Respecting people’s right to choose healthily or unhealthily was considered a fundamental human right and critical to effective nutrition education. Contextualising non-traditional foods in relation to origin, history, processes of production, distribution and preparation may have more relevance for Yolngu than focusing solely on the nutritional attributes of particular foods. In addition, people
also had a generally good understanding of health promoting foods and the relationship between food and health. For example, the broad constructs of balance, variety, fresh and natural food, control, not being greedy, eating fruits and vegetables, and limiting fatty foods and sweet foods, (discussed in association with traditional foods and non-traditional foods), were all identified as important constituents of healthy eating. However Yolngu view food as part of a total system. It was the non-Aboriginal food system that people did not think they adequately understood, particularly as the non-Aboriginal food system is not generally interconnected spiritually. Building on people’s traditional knowledge base to increase their knowledge and understanding of the non-traditional food system, was perceived as critical to reaffirm cultural identity and to build meaning of a foreign food system.

Fourthly, the nutritional value of traditional food is recognised in the literature. It has generally been assumed however that traditional foods do not contribute significantly to dietary intake. This assumption may not be valid for all Aboriginal communities. This research has shown that for the study community, traditional foods continue to play an important role in preventing hunger associated with food insecurity for some households, as occurred during the mission era. The diminishing use however of traditional foods is seen by Aboriginal people as underlying deep cultural concerns that relate to health and nutrition.

Lastly, this research has identified key components of the store system that influence practices to improve the nutritional quality of the store food supply: store governance and the power of the store manager; workforce training and development; adequate infrastructure; negotiating a partnership between profit and health and the role of feed-back and relationships. These components were shown to account for negative and positive changes in the nutritional quality of the food supply. This research has proposed a model to support nutrition improvement in the remote store setting and a simple monitoring tool that has the potential to be widely applied across remote Aboriginal community stores to monitor and evaluate nutrition intervention. The feasibility and effectiveness of this model however needs to be tested with further research.
11.4. Implications for policy and practice

Green and Kreuter\textsuperscript{69} have identified three broad determinants of health that must be addressed in a socio-ecological model to support health. These are; 1) the environment must offer economic and social conditions conducive to health; 2) these environments must provide life skills so individuals can make decisions to engage or not engage in behaviours that maintain their health; 3) healthful options among the goods and services offered must be available. These three broad determinants of health are used to discuss at a general level the policy and practice implications resulting from this research.

1) Economic and social conditions conducive to health

Approaches to nutrition improvement need to comprise strategies that encompass the multiple levels of influence on nutrition behaviour. Interventions that do not address the broader underlying influences on nutrition behaviour will be limited in their impact. For example, improvements in the nutritional quality of the food supply will be limited by people’s purchasing power and the adequacy of household infrastructure. The National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan identifies key strategic action areas across government sectors. A comprehensive strategy for working intersectorally is required at the community level with a “whole-of-government” commitment to support such an approach. The theory underlying nutrition interventions needs to be made explicit and practitioners require support to conduct rigorous process evaluation rather than effort and resources being solely directed to activity implementation. This process evaluation is needed to build a knowledge base on effective interventions, processes and contextual issues.

Within this approach, resources need to be committed to building the capacity of community members to initiate, plan, develop, implement and evaluate interventions that will achieve improved nutrition outcomes. This commitment to capacity building needs to be made explicit in policy documents and service plans.
That poverty is a key driver of food choice and nutrition behaviour calls for a reassessment of government policy relating to food and nutrition. While government commitment to improving educational levels and reducing unemployment in the long-term is essential, short-term strategies to relieve food insecurity are urgently required. There is a strong argument that greater government intervention is appropriate in a closed captured market. Price-capping of recommended foods may be one possible strategy. The current strategy of cross-subsidisation of recommended foods against “undesirable” products such as cigarettes or take-away food may only serve to further disadvantage people. Appropriate legislation to ensure display of food prices and non-exploitive marketing also needs to be considered.

Nutritional gains will also be limited while there is ready access to illicit drugs in remote communities.

Increased resources need to be committed to the development of traditional plant and animal resources as an economic and employment base.

Better integration of traditional foods into the school curriculum may result in a curriculum that is more meaningful and respectful of Yolngu structures and subsequent improved participation of community members and young people in the formal education structure. In addition, provision for supporting traditional structures in communities to engage young people and ensure opportunities for knowledge transfer need to be supported if the community consider this to be important.

2) Life skills so individuals can make decisions to engage or not engage in behaviours that maintain their health

This research has shown that broader economic, social and environmental factors underlie nutrition behaviour, and that poor dietary practices are both maintained by environmental influences and learned, thus becoming normative behaviour. Environmental change can influence the behaviour of the individual without any intermediary change in knowledge or skill. However social-ecological theory also
holds the view that the individual can alter their environment. Intervention therefore requires both creating a supportive environment and the modifying of social norms. Mobilising community action through education strategies can help to facilitate and support environmental change. The tobacco action\textsuperscript{205}, HIV/AIDS studies\textsuperscript{191} and community-wide interventions to reduce the risk of CVD\textsuperscript{175}, have shown that engaging lay opinion leaders or highly influential people in the community can help facilitate community support. Mass media campaigns have also been shown to be effective in mobilising community action. Well-planned strategies informed by theory need to be developed at the community level to modify social norms and mobilise community action to support environmental change.

This research has identified a number of factors that need to be taken into account in relation to a nutrition education strategy:

- Education in a Yolngu context is based on relationships, is non-directive, encouraging and motivating rather than didactic, and respects the right of the individual to engage in healthful or unhealthful behaviours.
- The traditional food system is a critical reference point for nutrition education and is powerfully linked with cultural identity.
- Food is viewed as belonging to a knowledge system and representing an epistemology.
- Proximal factors such as affordability, taste, convenience and presentation drive individual food choice more so than attributes that may impact on health in the future.

3) Healthful options among the goods and services offered

Institutions providing a food service in remote communities have a responsibility to provide for the nutritional requirements of the community. Food-related policy needs to articulate clearly what range of foods need to be made available to ensure adequate nutrition for the community. Due to the uniqueness of the closed market economy of remote communities, greater government surveillance is required to ensure the availability and affordability of foods required for nutritional health. This research proposes a framework to achieve nutritional outcomes through an
organisation systems/capacity building approach that incorporates CQI theory to achieve incremental improvements in the nutritional quality of the food supply. This approach provides a framework for collaboration between key-stakeholders and community participation in planning and decision-making.

Given the closed market in remote communities, there is a need to review legislation and enforcement of legislation that relates to marketing, pricing and display of prices.

11.5. Implications for research

As noted in the section on implications for policy and practice, interventions to achieve improved nutritional outcomes need to be developed with a strong inbuilt research component. This is important to build an evidence base of effective interventions and to learn from the intervention development and implementation process. In addition, attention needs to be directed at identifying and developing comprehensive, multi-level community-based strategies that are effective in positively influencing social norms and mobilising community action. This research has shown that little improvement in the nutritional health of Aboriginal people in remote communities may be achieved in the long term without addressing the broader determinants of nutrition such as meaningful employment, housing, cost of goods and services and availability of illicit substances.

The capacity building/CQI framework proposed in Chapter 9, Section 9.5 to facilitate a systems approach to improving the nutritional quality of the food supply available through the store in remote communities, needs to be further developed, refined and trialled to test its feasibility, effectiveness and transferability. This also applies to the monitoring tool developed in Chapter 10 of this thesis. We are currently evaluating the transferability of the monitoring tool across stores in remote Australia. Potentially this monitoring tool could be used to provide ongoing feedback on purchasing patterns required to inform and facilitate the implementation of a comprehensive approach to improving nutrition at the community level.
This research has highlighted widespread food insecurity in the study community which is alleviated to a certain extent through a cultural social security system. Whether food insecurity exists with or without hunger cannot be determined from this research. There has been little research in this area, although at a national level there is evidence that suggests wide-spread food insecurity among the Australian Indigenous population. Exploratory research is required to determine the meaning of food insecurity and to develop useful and reliable indicators to measure its magnitude and to identify vulnerable sub-populations.

Strategies to alleviate the high cost of food, beverages and other household goods in remote communities need to be developed and trialled to inform the development of a policy to reduce food prices in remote communities. The impact of pricing policies on food purchasing patterns also needs to be examined. For example, elevating the profit margin on foods considered to be of lower nutritional value (such as confectionery and convenience foods) to subsidise a reduced profit margin on more nutritious foods such as fruits and vegetables, is commonly practiced in retail stores in remote Aboriginal communities. Although considered by retailers as an effective strategy driving healthier food choices, this strategy has not been evaluated and may be found to be disadvantaging people further in relation to nutrition.

Commitment to strengthening the research capacity of remote communities is required to support research that aims to engage with Aboriginal people to make visible their views on important issues relating to their health and well-being. Aboriginal people are intent on finding ways forward without other systems being continually imposed, including external research agendas. Enormous expectations are placed on researchers as well as communities to comply with multiple ethical frameworks in addition to strengthening cross-cultural research capacity, providing employment, and ensuring research benefits to the community or wider Aboriginal population. Research that is conducted with scientific rigour, and respect for cultural requirements, will increase the capacity of both research institutions and Aboriginal institutions.

The recent success of ranger and land management programs in the NT, such as the Gumurr Marthakal sea ranger program (Galiwin’ku)\textsuperscript{380}, in engaging Aboriginal
people in meaningful and culturally significant employment, provides potential scope for research relating to contemporary traditional food use and consumption. Research in this area seems vital considering the recent reforms contained in the Aboriginal Land Rights (NT) amendment bill 2006 that enables the NT government or Commonwealth to establish an entity to hold a 99 year lease or township areas. The purpose of this bill is to enable opportunities for home ownership and expedite processes for exploration and mining\textsuperscript{481}. Research relating to traditional food use and consumption, requires extreme cultural sensitivities particularly considering past attitudes to the traditional food system and Aboriginal people's spiritual connectedness to traditional foods. Aboriginal people engaged in land use management may be in the best position to undertake such research.

In conclusion, this research indicates that poverty is a key determinant of poor nutrition in remote Aboriginal communities more so than lack of knowledge of healthy eating. In de-emphasising differences between Aboriginal people and other low income populations, this research brings poverty to the forefront and places behaviours such as that associated with the feast/famine cycle in an economic framework rather than a cultural one. Unless the many dimensions of poverty, including education, employment, housing and cost of goods and services, are addressed, it is going to be very difficult to address poor nutrition. Solutions, however, cannot be imposed. Disempowering people has been shown to make people even more resentful to change, particularly when people do not identify with an imposed food system. There are community settings, such as the store, school, Aged-Care services, women’s programs and child care services that are particularly important for nutrition intervention where local people can be actively involved and empowered through the process of seeking solutions and achieving positive change. The traditional food system provides an important base for economic and social development and comprises a knowledge system where concepts of diet and healthy eating are understood.
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Appendices
Appendix 1 Data to determine community nutrition requirements

Galiwin’ku population, 2001

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1, both sexes</td>
<td>26</td>
</tr>
<tr>
<td>1-3, both sexes</td>
<td>126</td>
</tr>
<tr>
<td>4-7, both sexes</td>
<td>146</td>
</tr>
<tr>
<td>8-11, males</td>
<td>73</td>
</tr>
<tr>
<td>8-11, females</td>
<td>65</td>
</tr>
<tr>
<td>12-15, men</td>
<td>47</td>
</tr>
<tr>
<td>12-15, women</td>
<td>49</td>
</tr>
<tr>
<td>16-18, men</td>
<td>57</td>
</tr>
<tr>
<td>16-18, women</td>
<td>42</td>
</tr>
<tr>
<td>19-64, men</td>
<td>324</td>
</tr>
<tr>
<td>19-54, women</td>
<td>353</td>
</tr>
<tr>
<td>64+, men</td>
<td>9</td>
</tr>
<tr>
<td>54+, women</td>
<td>29</td>
</tr>
<tr>
<td>Pregnant women &lt;19 yrs</td>
<td>(5)</td>
</tr>
<tr>
<td>Breastfeeding women &lt;19 yrs</td>
<td>(6)</td>
</tr>
<tr>
<td>Pregnant women &gt;=19 yrs</td>
<td>(44)</td>
</tr>
<tr>
<td>Breastfeeding women &gt;=19 yrs</td>
<td>(59)</td>
</tr>
<tr>
<td>Total</td>
<td>1346</td>
</tr>
</tbody>
</table>

1ABS census, 2001
226 children < 12 months not included in analyses
3The number of pregnant women was based on a total of 65 pregnancies for 2001 & an estimation of 49 women being pregnant at time of census and 65 women breastfeeding. 10% of pregnancies were estimated to occur in the < 19 yrs age group.
4Population projection of 2.25% used to estimate 2005 total population

Recommended nutrient density, Galiwinku, 2005

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Recommended density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>9420.0 kj</td>
</tr>
<tr>
<td>Protein</td>
<td>3.85 g/1000kj</td>
</tr>
<tr>
<td>Thiamine</td>
<td>0.09 mg/1000kj</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.09 mg/1000kj</td>
</tr>
<tr>
<td>Niacin</td>
<td>1.13 mg/1000kj</td>
</tr>
<tr>
<td>Folate</td>
<td>32.4 µg/1000kj</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>3.91 mg/1000kj</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>58.94 Ret.eq/1000kj</td>
</tr>
<tr>
<td>Iron</td>
<td>0.80 mg/1000kj</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.84 mg/1000kj</td>
</tr>
<tr>
<td>Calcium</td>
<td>89.02 mg/1000kj</td>
</tr>
<tr>
<td>Magnesium</td>
<td>24.89 mg/1000kj</td>
</tr>
<tr>
<td>Potassium</td>
<td>330.07 mg/1000kj</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>72.41 mg/1000kj</td>
</tr>
<tr>
<td>Sodium</td>
<td>89.18 mg/1000kj</td>
</tr>
</tbody>
</table>
**Nutrient density, wider Australia, NNS 1995**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Nutrient density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>9067.5</td>
</tr>
<tr>
<td>Protein</td>
<td>9.61 g/1000kj</td>
</tr>
<tr>
<td>Thiamine</td>
<td>0.18 mg/1000kj</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.23 mg/1000kj</td>
</tr>
<tr>
<td>Niacin</td>
<td>4.43 mg/1000kj</td>
</tr>
<tr>
<td>Folate</td>
<td>28.16 µg/1000kj</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>13.44 mg/1000kj</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>124.26 Ret. eq/1000kj</td>
</tr>
<tr>
<td>Iron</td>
<td>1.49 mg/1000kj</td>
</tr>
<tr>
<td>Zinc</td>
<td>1.26 mg/1000kj</td>
</tr>
<tr>
<td>Calcium</td>
<td>93.63 mg/1000kj</td>
</tr>
<tr>
<td>Magnesium</td>
<td>34.60 mg/1000kj</td>
</tr>
<tr>
<td>Potassium</td>
<td>345.46 mg/1000kj</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>162.16 mg/1000kj</td>
</tr>
<tr>
<td>Sodium</td>
<td>- mg/1000kj</td>
</tr>
</tbody>
</table>

¹ Not available for NNS 1995
### Appendix 2 Shopping basket, Galiwin’ku store

**Shopping basket, Galiwin’ku store compared to Darwin supermarket, March 2005**

<table>
<thead>
<tr>
<th>Food Item</th>
<th>March 2005 Purchase cost ($)</th>
<th>Community Store</th>
<th>Darwin supermarket</th>
</tr>
</thead>
<tbody>
<tr>
<td>100g Nescafe blend 43</td>
<td>$8.41</td>
<td>$4.99</td>
<td></td>
</tr>
<tr>
<td>2 l Golden Circle orange crush orange fruit juice cordial</td>
<td>$6.09</td>
<td>$2.85</td>
<td></td>
</tr>
<tr>
<td>2 min noodles magi</td>
<td>$1.09</td>
<td>$0.67</td>
<td></td>
</tr>
<tr>
<td>250g Hutton ham fresh off bone</td>
<td>$4.47</td>
<td>$5.06</td>
<td></td>
</tr>
<tr>
<td>2kg white sugar</td>
<td>$5.05</td>
<td>$2.34</td>
<td></td>
</tr>
<tr>
<td>300mls Pails Orange juice 100%</td>
<td>$1.65</td>
<td>$1.49</td>
<td></td>
</tr>
<tr>
<td>500g Birdseye peas</td>
<td>$3.06</td>
<td>$1.74</td>
<td></td>
</tr>
<tr>
<td>70g fantastic noodles</td>
<td>$2.37</td>
<td>$1.52</td>
<td></td>
</tr>
<tr>
<td>Apricot chicken Magi</td>
<td>$2.31</td>
<td>$1.50</td>
<td></td>
</tr>
<tr>
<td>B&amp;G sugar 1kg</td>
<td>$2.14</td>
<td>$1.05</td>
<td></td>
</tr>
<tr>
<td>Bananas/ kg</td>
<td>$3.35</td>
<td>$2.45</td>
<td></td>
</tr>
<tr>
<td>Beans/ kg</td>
<td>$5.31</td>
<td>$3.98</td>
<td></td>
</tr>
<tr>
<td>Braised steak &amp; onion 410g</td>
<td>$4.89</td>
<td>$2.96</td>
<td></td>
</tr>
<tr>
<td>Bread white thick</td>
<td>$4.51</td>
<td>$2.28</td>
<td></td>
</tr>
<tr>
<td>Broccoli/ kg</td>
<td>$4.95</td>
<td>$3.98</td>
<td></td>
</tr>
<tr>
<td>Capsicum/ kg</td>
<td>$11.50</td>
<td>$9.76</td>
<td></td>
</tr>
<tr>
<td>Classic assorted cream Arnotts</td>
<td>$6.97</td>
<td>$4.05</td>
<td></td>
</tr>
<tr>
<td>Continental pasta and sauce 125g</td>
<td>$2.96</td>
<td>$1.99</td>
<td></td>
</tr>
<tr>
<td>Coon tasty 250g</td>
<td>$5.92</td>
<td>$2.99</td>
<td></td>
</tr>
<tr>
<td>Corned beef hamper 340g</td>
<td>$5.62</td>
<td>$3.76</td>
<td></td>
</tr>
<tr>
<td>Cracker barrel 250g</td>
<td>$4.97</td>
<td>$4.06</td>
<td></td>
</tr>
<tr>
<td>Fray Bentos 425 g Steak &amp; kidney Pie</td>
<td>$8.13</td>
<td>$5.05</td>
<td></td>
</tr>
<tr>
<td>Heinz baked beans 420g</td>
<td>$2.07</td>
<td>$1.29</td>
<td></td>
</tr>
<tr>
<td>Heinz tuna green seas 425 g</td>
<td>$7.94</td>
<td>$4.65</td>
<td></td>
</tr>
<tr>
<td>Margarine canola</td>
<td>$4.27</td>
<td>$2.77</td>
<td></td>
</tr>
<tr>
<td>Medium tomatoes/ kg</td>
<td>$5.04</td>
<td>$5.98</td>
<td></td>
</tr>
<tr>
<td>Milk powder full cream B&amp;G 1kg</td>
<td>$7.99</td>
<td>$5.93</td>
<td></td>
</tr>
<tr>
<td>Milk powder full cream diploma 400g</td>
<td>$6.59</td>
<td>$4.26</td>
<td></td>
</tr>
<tr>
<td>Milo nestle 450g</td>
<td>$8.82</td>
<td>$4.38</td>
<td></td>
</tr>
<tr>
<td>Mint slice 200g</td>
<td>$5.14</td>
<td>$2.35</td>
<td></td>
</tr>
<tr>
<td>Nestle condensed milk 395g</td>
<td>$3.19</td>
<td>$2.07</td>
<td></td>
</tr>
<tr>
<td>Onions/ kg</td>
<td>$2.85</td>
<td>$2.49</td>
<td></td>
</tr>
<tr>
<td>Pauls Orange juice 2l</td>
<td>$4.13</td>
<td>$3.63</td>
<td></td>
</tr>
<tr>
<td>Peanut butter smooth kraft 375g</td>
<td>$5.45</td>
<td>$3.13</td>
<td></td>
</tr>
<tr>
<td>Pineapple each</td>
<td>$3.57</td>
<td>$3.98</td>
<td></td>
</tr>
<tr>
<td>Plain flour 1kg tip top</td>
<td>$2.77</td>
<td>$2.29</td>
<td></td>
</tr>
<tr>
<td>Pumpkin/ kg</td>
<td>$1.53</td>
<td>$1.98</td>
<td></td>
</tr>
<tr>
<td>Rice bubbles 300g</td>
<td>$5.17</td>
<td>$3.03</td>
<td></td>
</tr>
<tr>
<td>Rice jasmine koala 1kg</td>
<td>$3.23</td>
<td>$2.26</td>
<td></td>
</tr>
<tr>
<td>S.R flour 1kg</td>
<td>$3.08</td>
<td>$2.29</td>
<td></td>
</tr>
<tr>
<td>San remo 500g pasta</td>
<td>$3.34</td>
<td>$1.92</td>
<td></td>
</tr>
<tr>
<td>SAO</td>
<td>$3.37</td>
<td>$1.97</td>
<td></td>
</tr>
<tr>
<td>Food Item</td>
<td>Community Store</td>
<td>Darwin supermarket</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------</td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>Scotch finger 250g</td>
<td>$3.90</td>
<td>$2.35</td>
<td></td>
</tr>
<tr>
<td>Spaghetti 500g san remo</td>
<td>$3.34</td>
<td>$1.92</td>
<td></td>
</tr>
<tr>
<td>Spaghetti Heinz 420g</td>
<td>$2.18</td>
<td>$1.29</td>
<td></td>
</tr>
<tr>
<td>Spam 340g</td>
<td>$5.08</td>
<td>$3.78</td>
<td></td>
</tr>
<tr>
<td>Stock powder beef magi 110g</td>
<td>$3.27</td>
<td>$2.09</td>
<td></td>
</tr>
<tr>
<td>Sugar white CSR 2kg</td>
<td>$5.05</td>
<td>$2.34</td>
<td></td>
</tr>
<tr>
<td>Sultana Bran 500g</td>
<td>$7.46</td>
<td>$4.34</td>
<td></td>
</tr>
<tr>
<td>Tea cup bags bushels 100s</td>
<td>$5.84</td>
<td>$4.66</td>
<td></td>
</tr>
<tr>
<td>Tim tam 200g</td>
<td>$5.14</td>
<td>$2.35</td>
<td></td>
</tr>
<tr>
<td>Tomato paste leggos 500g</td>
<td>$5.12</td>
<td>$2.97</td>
<td></td>
</tr>
<tr>
<td>Trident rice crackers</td>
<td>$2.90</td>
<td>$1.38</td>
<td></td>
</tr>
<tr>
<td>Uncle Toby’s muesli bar yoghurt top 250g</td>
<td>$7.85</td>
<td>$3.42</td>
<td></td>
</tr>
<tr>
<td>Weet bix 750g</td>
<td>$6.26</td>
<td>$3.62</td>
<td></td>
</tr>
<tr>
<td>Yoghurt Yoplait lite 1kg</td>
<td>$6.06</td>
<td>$4.06</td>
<td></td>
</tr>
</tbody>
</table>

**Total cost**                                      **$264.71** | **$173.74**
Appendix 3 Statement of Methodist Overseas Mission District Policy endorsed by the North Australia District Synod in 1940.

A. Our Mission Work among the aboriginals of Arnhem Land is undertaken with the following facts and definite convictions on view: -

1). That despite the very primitive stage of development which characterises these aboriginals they are capable of accepting the teaching of Jesus and also of considerable social and economic development.

2). That the explanation of their extremely primitive condition lies mainly in the fact that of their isolation from the rest of mankind and their lack of opportunity, and not in an absence of inherent qualities necessary to development.

3). That a continuance of the tragedy which contact with civilisation has wrought for this race may be avoided, and that the frequently made statement that the aboriginals are “a dying race” is not necessarily true, years of experience on our stations serving to indicate that under the protection and care of the mission they are definitely increasing.

4). Believing that the ultimate contact of aboriginal with white is unavoidable it is not anticipated that these aboriginals will remain for all time in isolated communities of their own race, but that they will in due course take their place in our general Australian life.

5). That they are capable of such development as will enable them to take their place in our civilised communities without injury to themselves, and that, particularly in our Northern Tropical districts, an honourable and valuable sphere of service for them will always exist.

6). That in view of their extremely backward condition real development can only be brought about by a long, patient, and sympathetic process extending over several generations.

7). That a necessary stage in their complete development will be the creation of independent self-respecting and self-supporting communities in Arnhem Land or similar districts.

8). That during this period of development it is essential that they should be, as far as possible, segregated and protected from influences and contacts not calculated to benefit them.
B. The means by which this objective of the Christianisation and the Civilisation of these aboriginals must be sought may be summarised as hereunder:

1). By the establishment of Mission Stations at strategical points in Arnhem Land. Such stations to be centres from which other supporting activities, such as patrols and outstations, may be directed.

2). That on such stations instruction in the truths of the Christian Religion, and in the arts and crafts necessary to settled life, be imparted to them.

3). That recognising the tremendous gap which exists between aboriginal culture and our own respect to Religious Beliefs, and social and economic life, the necessary transition be made slowly and carefully, every care being taken to avoid a rude disruption of existing safeguards and sanctions.

4). That every endeavour be made to develop the personal character of the aboriginals and that all activities be definitely directed to that end.

5). That care be taken to avoid the danger of debasing the aboriginals by relieving them of all just responsibility for their own communities and by allowing them to become wholly dependent on the mission.

6). That the practical application of the teaching of Jesus be emphasised, and that every effort be made to help the aboriginals to incorporate that teaching into their normal standards of life.

7). That with the acceptance of the Christian Religion every encouragement be given them to engage in religious and social service among their own people.

8). That the aboriginals be encouraged to adopt the necessary habits and industries of settled life, particularly simple forms of agriculture, which must form the basis of a more advanced mode of living.

9). That we endeavour to develop the aboriginal’s own arts and crafts

10). That education be regarded as an important branch of our stations activities and that facilities be provided for primary education, simple technical and manual training, and direction in home-craft and hygiene.

11). That so far as possible the vernacular be employed as the medium of education

12). That steps be taken to elevate the position of aboriginal women and to secure for them a more important status in the community.

13). That in the fulfilment of the national Duty to improve the lot of our aboriginal people we cordially co-operate with the Government Department of Native Affairs.
## Appendix 4 Summary of events relating to the food supply and nutrition of Aboriginal people of Galiwin’ku from pre-European settlement to 1975

<table>
<thead>
<tr>
<th>Time period</th>
<th>Comment</th>
<th>Store</th>
<th>Gardens</th>
<th>Rations</th>
<th>Hunting</th>
<th>Sample day issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-European settlement</td>
<td>Contact with Macassan trepang fishermen during the wet season; introduced rice, brown corn, alcohol and tobacco Contact with Japanese pearlers</td>
<td></td>
<td></td>
<td></td>
<td>Reliance on traditional food: foraged foods and marine products collected by women for working men &amp; their families</td>
<td></td>
</tr>
<tr>
<td>1925</td>
<td>Milingimbi mission established in 1923: population 275 people</td>
<td>Maize grown as alternative to flour</td>
<td>Rations for men employed: Flour, tobacco, rarely meat (occasional goat meat)</td>
<td></td>
<td>Ration supplies provided for workers. Over a week period of residing in logging camp, hunted for</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>Workers paid “Nark”: bit of soap, tea &amp; sugar</td>
<td>No store, no money paid</td>
<td>Rice, tobacco and sugar</td>
<td></td>
<td>Fish, shellfish, dugong, turtles, wallaby. Shepherdson commented that with increasing population, not sufficient natural food sources</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td></td>
<td>Sweet potatoes, yams planted as well as watermelon &amp; tomatoes</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1932</td>
<td>Tobacco introduced as currency: could use to buy tomahawk, fishing line etc</td>
<td>First “comparatively large” crop of sweet potatoes harvested. People started own gardens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1934</td>
<td>4 families tending their own gardens, growing sweet potatoes, melons, tomatoes, pawpaws and banana trees planted.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1936</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event/Comment</td>
<td></td>
<td></td>
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<tr>
<td>------</td>
<td>--------------</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1938</td>
<td>Youngsters eating most of the day from natural food sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1939</td>
<td>The new deal: emphasis on training for citizenship – assimilation era</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1939</td>
<td>Sweet potato, peanuts, sorghum, cassava, rice, pigs, goats and fish augmenting people’s diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1944</td>
<td>Bell rings – church service. Rations then issued to workers. 10am – billy of tea. Evening rations distributed.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1944</td>
<td>Elcho Island mission started in 1942, MOM endorses as permanent mission in 1944: 200 people &amp; 5 staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1944</td>
<td>Beginning of cash economy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1944</td>
<td>Child endowment commenced in 1942</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1946</td>
<td>Purchase of Tiger Moth &amp; trading with people on homelands (flour, sugar, jam, tobacco, matches, razor blades, combs, mirrors, billy cans, towels, shorts, sulus, skirts. Purchased with cash received for crocodile skins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1946</td>
<td>10 acres general cultivation, 2 acres plantation: bananas, mangoes, pawpaw: 40 goats and 11 cattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1946</td>
<td>WW2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1949</td>
<td>Baby welfare clinic started</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1949</td>
<td>Cash payments started</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>Council of Aboriginal leaders formed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>Fijian Agriculturalist: 10 acres general cultivation, 2 acres plantation: bananas, mangoes, pawpaw: 40 goats and 11 cattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Assimilation policy</td>
<td>Government ration scale issued</td>
<td>Import enriched foods</td>
<td>Local supply of milk poor</td>
<td>Development of local food supplies</td>
<td>Rations supplemented through hunting activities</td>
</tr>
<tr>
<td>------</td>
<td>---------------------</td>
<td>--------------------------------</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>1951</td>
<td>Assimilation policy</td>
<td>Government ration scale issued</td>
<td>If meat not available, credited to the workers wages</td>
<td>Local supply of milk poor; out of tinned milk due to breakdown of mission boat</td>
<td>Jam, cheese, honey, sultanas, dripping available for sale through trade store</td>
<td>8 cattle, 44 goats; 5 acres cassava, ½ acre sweet potato; ½ acre pineapple; 170 coconut tree; few banana and citrus planted, but all damaged with severe cyclone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If meat not available, credited to the workers wages</td>
<td>Jam, cheese, honey, sultanas, dripping available for sale through trade store</td>
<td>Local supply of milk poor; out of tinned milk due to breakdown of mission boat</td>
<td>8 cattle, 44 goats; 5 acres cassava, ¼ acre sweet potato; ¼ acre pineapple; 170 coconut tree; few banana and citrus planted, but all damaged with severe cyclone</td>
<td>Dry rations to all workers and sick natives: 2/3 wholemeal &amp; ⅓ white flour; brown rice; wholewheat; brown sugar; 1 tin of meat per worker per day</td>
</tr>
<tr>
<td>1952</td>
<td></td>
<td>Imported foods: flour, porridge meal, rice, tea, sugar, syrup, dripping, cheese, powdered milk, raisins, lollies</td>
<td>Development of local food supplies “rather slow”</td>
<td>8 acres under cultivation – peanuts &amp; sorghum; lime for fertilizer made from burning sea-shells; cassava, sweet potatoes and cowpeas suffering due to two dry monsoon seasons and salt infiltration of main water supply</td>
<td>Children: 4 oz flour, unpolished rice, 10oz milk; children attending school are issued with extra food</td>
<td>Many of able-bodied population spend much time gathering native foods; Children not attending school, collect considerable quantities of native food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flour, wheatmeal, rice, syrup, tea, sugar – imported staples: Workers can buy sugar, syrup, cheese, sultanas and dried fruit</td>
<td>40 goats provides milk for children &amp; those on special diet; 10 acres of garden produce – cassava, sweet potatoes, peanuts, rice, bananas, yams, pineapples, limes, tomatoes; when available distributed to people</td>
<td>Workers: full rations for 6 days, with part rations for Sat; 24 ozs flour + wheatmeal + 3oz tea, with sugar added per day. Children: 8oz of flour per day + ½ pint milk Aged &amp; infirm: 12 oz flour per day, 7 days per week + ½ pint milk</td>
<td>Workers, sick &amp; aged: Breakfast: 4-6oz wholemeal flour or unpolished rice. Dinner: 12 oz flour or tinned meat Supper: flour or rice, tea, sugar, bush- or sea-foods</td>
<td>Workers, sick &amp; aged: Breakfast: 4-6oz wholemeal flour or unpolished rice. Dinner: 12 oz flour or tinned meat Supper: flour or rice, tea, sugar, bush- or sea-foods</td>
</tr>
<tr>
<td>1953</td>
<td>welfare ordinance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954</td>
<td>School commenced in 1953</td>
<td>Pregnant and lactating mothers receiving special diet</td>
<td>Flour, wheatmeal, rice, syrup, tea, sugar – imported staples: Workers can buy sugar, syrup, cheese, sultanas and dried fruit</td>
<td>40 goats provides milk for children &amp; those on special diet; 10 acres of garden produce – cassava, sweet potatoes, peanuts, rice, bananas, yams, pineapples, limes, tomatoes; when available distributed to people</td>
<td>Fish is provided, 3 men being constantly employed in line &amp; spear fishing: a minimum catch of 100lbs being available for rations</td>
<td>Workers, sick &amp; aged: Breakfast: 4-6oz wholemeal flour or unpolished rice. Dinner: 12 oz flour or tinned meat Supper: flour or rice, tea, sugar, bush- or sea-foods</td>
</tr>
</tbody>
</table>

426
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Detail</th>
<th>Note</th>
</tr>
</thead>
</table>
| 1955/1956 | A kitchen and dining area constructed | A succession of epidemics  
Concerted effort needed to ensure an adequate diet of nourishing food for growing population | The state of nutrition of the individual native appears to depend upon his opportunities for free-lance food getting  
Sick natives and pregnant & lactating mothers receive special diet which consists of ordinary diet with the addition of fish, when available + 1 pint of milk |
| 1956 | Wages introduced | A bore for irrigation planned | A midday meal provided to those on rations when adequate fish or beef available |
| 1958 | Large refrigerator installed: locally built boats used to develop fishing industry | Store provided items for sale: clothes, hurricane lamps, hair oil, blankets, fishing lines & sinkers, needles, torch globes, sugar, syrup, dried fruit, lollies  
Individual effort on part of natives encouraged: quite good homes with gardens noticed;  
Pineapples, sweet potato, watermelon, banana, pawpaw, peanuts, rice |  
Breakfast: 3 oz white flour; wholemeal and rolled oats cooked by natives; powdered milk for children less than 16 yrs  
Midday: rice or pearled wheat, a conglomerate mass of fish, veg, dugong - large plateful; about 3 oz pawpaw, pineapple, banana, melons, potatoes as available  
Evening: rice or sweet potato uncooked |  
The maintaining of food supplies and other necessities for the Northern Missions was difficult with only 2 luggers in operation and in great demand. In suitable weather conditions, supplies were provided every 6 weeks  
People encouraged to participate in enumerative trade, such as selling garden produce, hunted foods, crafts and paintings |
<table>
<thead>
<tr>
<th>Year</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>Maternity allowances, age, widows and invalid pensions paid to mission.</td>
</tr>
<tr>
<td>1961</td>
<td>School: powdered milk mixed by hand in bucket &amp; distributed in plastic cups – no protection from flies and dust. Cups &amp; buckets only washed in cold water.</td>
</tr>
<tr>
<td>1959</td>
<td>Trade store: open every day except Saturday. Store divided into 2 sections: one side for men &amp; one side for women; Purchase of sweet products restricted to 1 tin of jam or syrup per family per week. Special bank at store: small notebooks used to record credit. Families buying weatherboard cottages at set weekly rental.</td>
</tr>
<tr>
<td>1960</td>
<td>A number of families from Elcho and Goulburn islands had moved out from the missions and were selling produce from their own gardens to the missions. Aged &amp; infirm: Breakfast: pannikin of white flour and fine meal + mixture of tea and raw sugar. Child maintenance: same as above. Middy &amp; dinner: cooked &amp; eaten in dining room under supervision. Special issue of milk for children, night and morning. Fishing industry with freezers and fish for local use and also export to Darwin.</td>
</tr>
<tr>
<td>1961</td>
<td>Two stores that house food in bulk; both are a rat &amp; mice paradise – odour pronounced. Stall for fresh lime juice on Fridays: conditions of stall completely insanitary. Agricultural and fishing industries produce supplementing rations and providing revenue through exports.</td>
</tr>
<tr>
<td>1961</td>
<td>Dry rations distributed daily: flour, wheatmeal, sorghum mixture; made into damper or gruel by individual. Hospital treatment room: a liquid gruel is mixed in buckets for small children &amp; babies. Friday – pay day &amp; ration issue made. Fishing industry with freezers and fish for local use and also export to Darwin.</td>
</tr>
<tr>
<td>1961</td>
<td>Breakfast for aged and infirm: cooked &amp; eaten in camp. Midday: when sufficient fish or game – stew is cooked with veg &amp; fruit. Workers: same as aged &amp; infirm &amp; children; expected to pay for meal. Selected workers (contract workers, such as saw millers, haulers, fishermen, hunters) expected to buy own food in bulk as leave camp for longer periods. Veg, fish, crabs and other foods prepared.</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| 1962 | Pressure from outside political groups – MOM resolves at conference to seek scientific advice for improved feeding  
Hot water system installed in community kitchen  
Dining room in operation for children  
Cooking done by native women unsupervised in 3x10gal copper boilers |
| 1963 | Aboriginal delegates to 6th biennial conference between government and mission to discuss liberties with citizenship, development of towns etc; Land rights come to the forefront; Gove bauxite development |
| 1964 | Social welfare ordinance; abolished concept of wardship  
Government concern re quality and quantity of rations for aged & infirm  
Ration system for employees dismantled – cash economy |
| 1965 | 700 people  
30 bed hospital erected  
Supervised infant feeding  
Frozen fish & crab being exported  
Children: 4mths to toddlers – 3 meals a day at hospital  
Breakfast: farex & milk (not well attended) |
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Meal Details</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>30 mission staff members</td>
<td>Lunch: egg custard, fresh fruit &amp; milk, Tea: meat or meat juices, veg + added margarine, fresh fruit and milk</td>
<td>10am: custard, fruit and milk, 2.30pm: fish, rice &amp; milk, Midday meal provided for school children: supervised by home craft instructress</td>
</tr>
<tr>
<td></td>
<td>Electricity made available for housing</td>
<td></td>
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<tr>
<td></td>
<td>Sister-in-charge &amp; kitchen supervisor attend to pre-school feeding arrangements</td>
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<tr>
<td>1966</td>
<td>Aboriginal co-op of 4 men purchased fishing boat “river song”</td>
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<tr>
<td>1967/1968</td>
<td>Severe demands on kitchen staff who worked hard to produce 150 extra hot meals and dry rations each day as typhoid outbreak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>First high school student returns after 2 years in Brisbane</td>
<td>Annual primary industry produce valued at $78 000 – 37 tons bananas, 8300 doz eggs, 8 tons pawpaw, 75 tons of fish, 5400 gal milk, 19 tons watermelon, 50 tons of hay, 22 ton of vegetables: helped to feed mission residents and provide income</td>
<td>All school aged children are given 3 meals a day; general nutrition &amp; Haemoglobin counts encouraging</td>
</tr>
<tr>
<td></td>
<td>Pop:950 people (50 Europeans)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hygiene issues with kitchen &amp; dining rooms: foundation of kitchen ideal harbour for rats &amp; cockroaches; plan to condemn kitchen until adequate fly screening, resurfaced &amp; foundations made vermin proof; Coppers clean but not suitable for food preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pop:950 people (50 Europeans)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased government subsidies for mission</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Galiwin’ku: industrial training centre of Arnhemland</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe demands on kitchen staff who worked hard to produce 150 extra hot meals and dry rations each day as typhoid outbreak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event/Development</td>
<td></td>
<td></td>
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<tr>
<td>------</td>
<td>------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>Elcho Island mission becomes Galiwin’ku township</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970s</td>
<td>Trainee bakers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>Mission requesting government funding for capital expenditure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1970s NT government training allowance scheme broadened to include mission $25-$36 per week for males and 75% of male wages for females

Major development of trade store with introduction of cash economy through training allowance
Appendix 5 NT Government schedule of ration scales

Table 1 is a Basic Ration Scale for working adults. The full scales is designed to provide approximately 3 500 calories plus all the nutrients in amounts recommended by recognized authorities. For other groups certain fractions of the scale are given, as shown in Table VI.

Table II lists extra issues of milk and fruit for children and pregnant and lactating women.

Table III lists foods which may be substituted for items in the Basic Ration Scale.

Table IV lists extra issues which should be issued as required and where practicable to provide variety in the menus.

Table V is a special scale for infants under 15 months to whom the other tables do not apply.

Table VI gives the fractions which should be applied to table for groups of different ages and occupations.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>BASIC RATION SCALE PER HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat (boneless weight)</td>
<td>Per day</td>
</tr>
<tr>
<td>1 lb</td>
<td>7 lb</td>
</tr>
<tr>
<td>Potatoes</td>
<td>41/2 oz.</td>
</tr>
<tr>
<td>Vegetables or fruit, fresh or tinned</td>
<td>41/2 oz.</td>
</tr>
<tr>
<td>Dried peas</td>
<td>1 oz</td>
</tr>
<tr>
<td>Bread or flour</td>
<td>12 oz</td>
</tr>
<tr>
<td>Baking powder</td>
<td>½ oz</td>
</tr>
<tr>
<td>Porridge meal</td>
<td>2 oz</td>
</tr>
<tr>
<td>Sugar</td>
<td>3 oz</td>
</tr>
<tr>
<td>Jam or syrup or treacle</td>
<td>2 oz</td>
</tr>
<tr>
<td>Dried milk or cheese</td>
<td>½ oz</td>
</tr>
<tr>
<td>Liver or</td>
<td>1 oz</td>
</tr>
<tr>
<td>Green vegetables</td>
<td>4 oz</td>
</tr>
<tr>
<td>Dripping, margarine or butter</td>
<td>1 oz</td>
</tr>
<tr>
<td>Salt</td>
<td>1 oz</td>
</tr>
<tr>
<td>Tea</td>
<td>3 oz</td>
</tr>
<tr>
<td>Water-pure potable water from an approved source and entirely available for drinking</td>
<td>6 pints</td>
</tr>
</tbody>
</table>

This item is designed to provide vitamin A. If any foods in item 10 or their alternatives are already being supplied up to the amount here stated, a further issue is not necessary.
### TABLE 11
**EXTRA ISSUES**

For pregnant and Lactating Women, Children 1-13

<table>
<thead>
<tr>
<th></th>
<th>Per day</th>
<th>per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk, fresh or dried</td>
<td>1 pt.</td>
<td>7 pts</td>
</tr>
<tr>
<td>Dried</td>
<td>3 oz</td>
<td>21 oz</td>
</tr>
</tbody>
</table>

For pregnant and Lactating women, children 1-6.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oranges or pawpaw</td>
<td>2 oz</td>
</tr>
</tbody>
</table>

### TABLE 111
**ALTERNATIVE FOODS**

Alternatives are given for most of the items in the Basic Ration Scale. A substitution may be made for the whole or part of an item. The alternative foods may be considered equivalent, in the amounts specified, to one pound of the corresponding item.

Every effort should be made to provide variety by issuing different alternatives.

<table>
<thead>
<tr>
<th>Item 1</th>
<th>Meat, fresh boneless</th>
<th>1 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh or salted mutton, beef, pork</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Or any recognized native meat</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Or tinned beef</td>
<td>12 oz</td>
<td></td>
</tr>
<tr>
<td>Or cooked meat</td>
<td>12 oz</td>
<td></td>
</tr>
<tr>
<td>Or fish, whole</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Or oysters (without shell)</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Or crab, lobster, crayfish (with shell)</td>
<td>2 lb</td>
<td></td>
</tr>
<tr>
<td>Or tinned fish</td>
<td>12 oz</td>
<td></td>
</tr>
<tr>
<td>Or eggs (bird or turtle)</td>
<td>½ lb</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 2</th>
<th>Potatoes</th>
<th>1 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yams or other edible roots</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Pumpkin</td>
<td>2 lb</td>
<td></td>
</tr>
<tr>
<td>Turnips</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Swedes</td>
<td>1 lb</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 4</th>
<th>Dried peas</th>
<th>1 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried beans</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Other nuts or peanuts (in shell)</td>
<td>1 ½ lb</td>
<td></td>
</tr>
<tr>
<td>Dried fruit</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Dehydrated vegetables</td>
<td>1 lb</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 6</th>
<th>Porridge meal</th>
<th>1 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oatmeal or rolled oats</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Wheatmeal</td>
<td>1 lb</td>
<td></td>
</tr>
<tr>
<td>Item 10</td>
<td>Liver</td>
<td>1 lb</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>Carrots</td>
<td>1 ½ lb</td>
</tr>
<tr>
<td></td>
<td>Green vegetables</td>
<td>4 lb</td>
</tr>
<tr>
<td></td>
<td>Green leaves or shoots</td>
<td>4 lb</td>
</tr>
<tr>
<td></td>
<td>Dried apricots</td>
<td>2 lb</td>
</tr>
<tr>
<td></td>
<td>Porto Rico Sweet potatoes</td>
<td>5 lb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 15</th>
<th>Milk</th>
<th>1 pt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dried milk</td>
<td>3 oz</td>
</tr>
<tr>
<td></td>
<td>Cheese</td>
<td>3 oz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 16</th>
<th>Oranges or Pawpaw</th>
<th>1 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lemons</td>
<td>1 lb</td>
</tr>
<tr>
<td></td>
<td>Pineapple, passionfruit, tomatoes</td>
<td>2 lb</td>
</tr>
<tr>
<td></td>
<td>Grapefruit, mango</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guava</td>
<td>3 oz</td>
</tr>
<tr>
<td></td>
<td>Tinned orange juice</td>
<td>12 oz</td>
</tr>
<tr>
<td></td>
<td>Cabbage or spinach</td>
<td>1 lb</td>
</tr>
</tbody>
</table>
Appendix 6 School based study instrument
√ Tick the foods you really like √
How often do you eat the following foods? Please tick your answer for each food.
<table>
<thead>
<tr>
<th>Food</th>
<th>Lots of times</th>
<th>Sometimes</th>
<th>Hardly ever</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red meat (bullocky)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Guya</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Chewing gum</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Baked beans</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Pasta/Spaghetti</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Cordial</strong></td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td><strong>Cake</strong></td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td><strong>Sweet biscuit</strong></td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td><strong>Tinned vegetables</strong></td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td><strong>Sandwich</strong></td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>1st Column</td>
<td>2nd Column</td>
<td>3rd Column</td>
<td>4th Column</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Dim sim or Chico roll</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Chicken wing or chicken leg</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Ice cup</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Ice cream</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Bubble gum</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Food Item</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Eggs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Meat pie</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Hamburger</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Hot dog</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Bread or bread roll</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Damper</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Djepi</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Breakfast Item</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Rice</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Noodles</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Weet-Bix</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Uncle Toby’s/ Porridge</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Cornflakes</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Milk (fresh, tinned, long life)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Fresh fruit (shop)</td>
<td>Tinned fruit</td>
<td>Dried fruit (sultanas, apricots)</td>
<td>Fruit juice</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------</td>
<td>--------------</td>
<td>---------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Fresh fruit (shop)</td>
<td><img src="image1" alt="Fresh Fruit" /></td>
<td><img src="image2" alt="Tinned Fruit" /></td>
<td><img src="image3" alt="Dried Fruit" /></td>
<td><img src="image4" alt="Fruit Juice" /></td>
</tr>
<tr>
<td>Tinned fruit</td>
<td><img src="image2" alt="Tinned Fruit" /></td>
<td><img src="image2" alt="Tinned Fruit" /></td>
<td><img src="image2" alt="Tinned Fruit" /></td>
<td><img src="image2" alt="Tinned Fruit" /></td>
</tr>
<tr>
<td>Dried fruit (sultanas, apricots)</td>
<td><img src="image3" alt="Dried Fruit" /></td>
<td><img src="image3" alt="Dried Fruit" /></td>
<td><img src="image3" alt="Dried Fruit" /></td>
<td><img src="image3" alt="Dried Fruit" /></td>
</tr>
<tr>
<td>Fruit juice</td>
<td><img src="image4" alt="Fruit Juice" /></td>
<td><img src="image4" alt="Fruit Juice" /></td>
<td><img src="image4" alt="Fruit Juice" /></td>
<td><img src="image4" alt="Fruit Juice" /></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td><img src="image5" alt="Sweet Potatoes" /></td>
<td><img src="image5" alt="Sweet Potatoes" /></td>
<td><img src="image5" alt="Sweet Potatoes" /></td>
<td><img src="image5" alt="Sweet Potatoes" /></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>hot chips</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packet chips</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cooked</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes – mashed potatoes, potatoes in stew, boiled potatoes, potato salad (not pkt. Chips or hot chips)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>salad</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(raw vegetables like lettuce, cucumber, tomatoes, carrots)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cooked vegetables like peas, pumpkin, carrots, broccoli (not salad and potatoes)

Take away food like beef and rice, Shepherds pie

Coke or sprite (fizzy drinks)

Chocolate

Lollies
When it’s the right season, how often do you eat the following foods?
Please tick your answer for each food.
<table>
<thead>
<tr>
<th>Food</th>
<th>Lots of times</th>
<th>Sometimes</th>
<th>Hardly ever</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mapu</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Miyapunu</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Nan'ka</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Bakarra</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Guya</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Miyapunu</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Dhan'pala</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Maranydjalk</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Nyek</td>
<td>Munydjutj</td>
<td>Djitama</td>
<td>Wetí</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>-----------</td>
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<td>----------</td>
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<td></td>
<td><img src="image" alt="Nyek" /></td>
<td><img src="image" alt="Munydjutj" /></td>
<td><img src="image" alt="Djitama" /></td>
<td><img src="image" alt="Wetí" /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Nyek" /></td>
<td><img src="image" alt="Munydjutj" /></td>
<td><img src="image" alt="Djitama" /></td>
<td><img src="image" alt="Wetí" /></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Narrani</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Gurrumattji</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Bidila Weti</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Balkpalk</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Gungun</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Dhirrang</td>
<td>O</td>
<td>o</td>
<td>o</td>
<td>.</td>
</tr>
<tr>
<td>Image</td>
<td>Name</td>
<td>Symbol</td>
<td>Symbol</td>
<td>Symbol</td>
</tr>
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<tr>
<td><img src="image" alt="Diyamu" /></td>
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<td>○</td>
<td>○</td>
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</tr>
<tr>
<td><img src="image" alt="Madi" /></td>
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<td>○</td>
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<td>○</td>
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<tr>
<td><img src="image" alt="Namura" /></td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td><img src="image" alt="Minhala" /></td>
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<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><img src="image" alt="Miyapunu biyapiya" /></td>
<td>Miyapunu biyapiya</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><img src="image" alt="Wakwak" /></td>
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<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><img src="image" alt="rakay" /></td>
<td>rakay</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>O</td>
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<td>---------------------</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Dhalarrmung</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nanka' bakarra</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nanka' bakarra</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dhanggi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nyoka</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latjin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bunybu</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. How strong is the feeling that you should eat Yolngu foods?

<table>
<thead>
<tr>
<th>Very strong</th>
<th>A fair bit</th>
<th>Some</th>
<th>A little bit</th>
<th>Not at all</th>
</tr>
</thead>
</table>

2. Most mornings, where do you get your breakfast?

- At home
- At school
- At the take away
- Most mornings I don’t have breakfast
3. Most evenings where do you get your dinner?
   O At home
   O At other families
   O At the take away
   O Most times I don't have dinner

4. Most times who makes your food at home?
   O Myself
   O My mother
   O My father
   O Other family member
   O Most times I don't have meals at home

5. Which box do you want to tick?
   O I always get enough to eat
   O Sometimes I don’t get enough to eat
   O Often I don't get enough to eat

6. Do you ever go hungry for a day?
   O YES
   O NO

8. Where do you learn the most about food?
   O TV
   O Radio
   O Reading books and magazines
   O Friends
   O Family
   O School
Draw a food that you really like, AND it’s really good for your body

Write a story about this food.

Why you like it
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Why it’s good for you
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Draw a food that you really like, BUT it’s not good for your body

Write a story about this food.

Why you like it
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Why it’s not good for you
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Appendix 7 Vignettes for school-based focus groups

Vignette 1

Vignette 2

Vignette 3: male version

Vignette 3: female version
Appendix 8 Probes for school-based focus groups

Perceptions of food in relation to health:
Two vignettes were presented consecutively to the students and the following questions pertaining to each vignette were asked:

Vignette 1: what is the story you see in the picture?; Are these 2 men different? If so, describe how they are different?; Why are they different?; Is this a problem?; If so, why is this a problem?.

Vignette 2: what is the story you see in the picture; are these 2 boys different?; If so, how are these two boys different?; Why are they different?; What might they be thinking?

Food security:
In the same focus groups as described above the students were shown a series of 4 vignettes (Vignettes 3 to 6). For each vignette students were asked to consider the picture and describe what was happening in the picture. The following probes were used by the facilitator for each of the vignettes: What is the story you see in the picture?; The young person [in the picture] is hungry, what will they do?; What do they want to eat?; How do they get the food they want?; If there is no food, how else will they get food?
Appendix 9 ALPA Food and Nutrition Policy, 1991

The aim of the ALPA nutrition policy is to increase the variety of healthy foods available in ALPA communities and stores.

Objectives:

- To replace some foods with healthier choices
  - Canola oil instead of other cooking oils
  - Polyunsaturated margarine (later canola margarine) instead of other margarines
  - To stock nutritious foods alongside other lines, including fresh fruit, fresh vegetables, wholemeal bread, 100 per cent fruit juice, diet drinks, dry biscuits, artificial sweeteners
- To introduce sandwich making
- To use shelf talkers to help identify healthy foods
- To employ Good Food People in the store
- To introduce a freight subsidy on fresh fruit and vegetables
Appendix 10 Goals, outcomes, indicators, outputs and activities derived from Eat Well Australia, NATSINSAP, NT Food and Nutrition Policy and Australian Guidelines for Healthy Eating
To improve the health of all Australians through improving nutrition and reducing the burden of diet-related disease (Eat well Australia)

**Goal**

- Increasing the consumption of vegetables and fruit
- Promoting optimal nutrition for women, infants and children
- Improving nutrition for vulnerable groups (which includes Indigenous Australians)
- Preventing overweight and obesity

**Priority areas**

- Eat plenty of vegetables, legumes and fruits
- Eat plenty of cereals (including breads, rice, pasta and noodles), preferably wholegrain
- Include lean meat, fish, poultry and/ or alternatives
- Include milks, yoghurts, cheeses and/or alternatives. Reduced fat varieties should be chosen where possible
- Drink plenty of water
- Limit saturated fat and moderate total fat intake
- Choose foods low in salt
- Consume only moderate amounts of sugar and foods containing added sugars

**Outcome**

- Improved access to a variety of affordable and good quality foods for rural and remote Indigenous peoples
- Aboriginal and Torres Strait Islander people have a consistent supply and variety of quality, affordable, nutritious food by addressing the major factors that contribute to food security
- Improved availability, variety, quality and affordability of core foods in remote communities
- Increased consumption of specific core foods at recommended levels in remote communities
- Increased consumption of vegetables and fruit to recommended levels
- Increased proportion of adult population in the healthy weight range

**Dietary Guidelines for Australian Adults**

**Goal**

- To improve the health of all Australians through improving nutrition and reducing the burden of diet-related disease (Eat well Australia)

**Priority areas**

- Increasing the consumption of vegetables and fruit
- Promoting optimal nutrition for women, infants and children
- Improving nutrition for vulnerable groups (which includes Indigenous Australians)
- Preventing overweight and obesity

**Outcome**

- Improved availability, variety, quality and affordability of core foods in remote communities
- Increased consumption of specific core foods at recommended levels in remote communities
- Increased consumption of vegetables and fruit to recommended levels
- Increased proportion of adult population in the healthy weight range

**Dietary Guidelines for Australian Adults**
Provide training and support to community based staff to implement initiatives to improve food supply in the store
Promote awareness of core food groups to community people
Assist communities to develop food and nutrition policies
Work with food industry to develop and promote healthier food products
Develop nutrition guidelines for remote take aways

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Develop and secure mechanisms of financial support to address store infrastructure issues
Explore the feasibility of initiatives such as co-operative buying, store management support groups and freight subsidies
Develop a national incentive system for healthy food store/ take away practices and management
Develop store management employment contracts and food and nutrition guidelines

Activities

NATSINSAP & Partners

Indicators

• Significant and measurable improvements in the supply, variety, availability, quality, cost and turnover of community store food
• Consumption of core foods in sentinel sites
• Apparent consumption of vegetables and fruits
• Proportion of population consuming at least 4 serves of vegetables

NATSINSAP & NT Food & Nutrition Policy

• National food and nutrition guidelines for stores/ take aways are developed and implemented
• Financial support for store infrastructure secured
• Local and regional initiatives recommended and implemented to address issues of store food supply, variety, availability, cost
• Healthy food available in store and take away outlets
• Community stores have appropriate food storage facilities to accommodate community demand

Partners