

**Household food security and child health outcomes in families with children  
aged 6 months to 4 years residing in Darwin and Palmerston, Northern  
Territory, Australia**

by

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A thesis submitted in fulfilment of the requirements  
for the degree of Doctor of Philosophy

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July 2017



## **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.

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## ABSTRACT

There are few published studies on household food insecurity among Australian families with young children. Using quantitative and qualitative approaches, I conducted studies relating to food security among Indigenous and non-Indigenous children aged 0.5-4 years residing in Darwin and Palmerston. My main objectives were to;

1. *Explore urban Indigenous Australian families' experiences of food security.*
2. *Determine the performance of the US 18-item household food security module within Indigenous Australian families and families (Indigenous and non-Indigenous) with children attending child care centres.*
3. *Identify factors that influence food security status within Indigenous Australian' families and families (Indigenous and non-Indigenous) with children attending child care centres.*
4. *Compare health parameters of children in food secure and food insecure households of families with children who attend child care centres.*

Within the Indigenous Australian families' sample, a quantitative and qualitative approach was undertaken to address the first two objectives. I used a modified United States 18-item Household Food Security Module (mUS 18-item Module), and measures of social determinants and psychological distress (Kessler-10 scale). I found that Indigenous Australian families with young children experienced food insecurity and that there was a relationship between food insecurity and psychological distress, socio-economic and/or demographic factors. Qualitative findings showed that families deployed various strategies to combat food insecurity. The main strategy was using social networks, and this was reciprocated among

extended family members. No families reported accessing charity agencies for support. Other strategies included putting off the paying of bills and purchasing cheaper foods.

Objectives three and four were addressed through a study undertaken in 17 childcare centres. This study revealed that food insecurity was also experienced by families within this population. Regression analysis showed that use of public transport, higher psychological distress and/or where wanting to food shop, were associated with food insecurity status. Children in food insecure households were significantly more likely to be overweight but had similar haemoglobin levels to children in food secure households.

As the mUS 18-item Module had not been used within the sampling populations, repeatability of the measure within a 2-week timeframe was undertaken. The kappa value showed fair agreement amongst the Indigenous Australian study population and excellent agreement among child care centre families.

While my thesis identified factors that impacted on household food insecurity within families with young children and their coping strategies, future studies are required. This includes larger studies to better understand food insecurity as well as cognitive reliability testing of the mUS 18-item Module. As also noted, future policies and programs addressing families are likely to be more effective if include psychological distress and food insecurity screenings.

## **Statement of Contributions**

I am truly grateful for the support I have received throughout my PhD and acknowledge others' contributions.

- **Intellectual support:**

Professor Anne Chang (principal supervisor) and Associate Professor Julie Brimblecombe (associate supervisor), who have contributed immensely to the conceptualisation and study design of this research and reviewing of thesis chapters.

- **Practical support:**

Mrs Helen Fejo-Frith and Mrs Sian Graham who both worked alongside me with the Indigenous Australian population recruitment and data collection. Their invaluable knowledge of the study population enabled acceptability of the research and myself.

Mrs Cate Wilson who worked alongside me with the general population data collection. Without Cate's insight into the practicalities of study implementation, including data collection processes and her 'can do' attitude, the process would not have run so smoothly. Cate was funded from Anne Chang's research funds.

- **Financial support:**

I am truly grateful for being financially supported throughout my PhD candidature. Therefore, a heartfelt thank you to:

The Ian Potter Foundation Indigenous Research Fellowship (Grant ID 20070455)

The National Health and Medical Research Council Public Health Postgraduate Research Scholarship (App ID APP1017539)

Menzies Foundation Allied Health Scholarship

## **Acknowledgements**

My PhD journey was not travelled alone, as there were many others who gave guidance, support and just listened.

First and foremost, a big thank you to my family and friends for the support and encouragement you've provided. I especially thank Glen, Ramona and Ignatius. Glen, my partner, who patiently listened to my woes and our children Ramona and Ignatius, who have not known life without this PhD study. Without your support, patience and encouragement throughout my PhD journey, the road would have been harder to travel.

To my supervisors, Professor Anne Chang and Associate Professor Julie Brimblecombe, it has been a privilege to work with you both. Your unwavering enthusiasm, support and dedication in seeing me through my PhD studies are truly appreciated and I am indebted to you both.

Professor Jan Ritchie, who reviewed my qualitative methods and findings chapters. Your attention to detail and knowledge of qualitative research was invaluable.

To Danila Dilba Health Service for permission to undertake my research through the Child Health and Immunisation clinics. Your support was very much appreciated. Thanks also to staff members who were supportive of the study and whom provided practical input.

To Bagot Community Health Service and Community Council for authorising the study to be undertaken at Bagot Community, providing practical support and recommending to me Mrs Helen Fejo-Frith to assist with recruitment.



The Northern Territory Government Department of Health in supporting the study and providing permission to recruit through Health Care Centres, Child Health and Immunisation Clinics.

To the Child Care Centre Boards, management and staff who were accommodating with my study and among whom nothing seemed to be a problem.

To the Menzies School of Health Research staff who became involved in some way, shape or form with my PhD studies. From assisting with my research; Mrs Sian Graham, Mrs Cate Wilson, Ms Gabrielle McCallum, Ms Vanya Hampton, the Child Health Team; to development of databases; Mrs Robyn Liddle and Ms Teagan Harris; to providing advice and assisting with statistical analysis; Ms Linda Ward and Ms Federica Barzi; and last but not least, Mrs Selma Liberato, Mrs Caroline Sheridan, Mrs Catherine Richardson; Ms Jen Girling.

Dr Kate Senior who assisted with qualitative research structure at the early stages of my PhD.

To Charles Darwin University Higher Research Degree office for their guidance in navigating the University system; Mrs Jayshree Mamtara and library services for providing valuable thesis writing and referencing information and advice, as well as locating journal articles that were not available onsite.

To the many not named, but who have provided words of encouragement and support. I thank you.

Last, but not least, to the parent-carers and children who participated in my study.

Without your involvement this study would not have taken place.

## **DEDICATION**

To Glen, Ramona and Ignatius who have experienced the highs and lows of a PhD  
for a good part of our family life.

To my mother, Jean McCarthy, who was a firm believer in education as key for  
future opportunities.

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## **ABBREVIATIONS**

ABS	Australian Bureau of Statistics
ADA	American Dietetics Association
AIHW	Australian Institute of Health and Welfare
AIMhi	Australian Integrated Mental Health Initiative
BMI	Body Mass Index
CCC	Child Care Centres
C-SNAP	Children's Sentinel Nutrition Assessment Program
CPS-FSS	Current Population Survey-Food Security Survey
CCHIP	Community Childhood Hunger Index Project
EWA	Eat Well Australia
DRUID	Darwin Regional Urban Indigenous Diabetes study
FAO	Food and Agriculture Organisation of the United Nations
IFAD	International Fund for Agricultural Development
K10 Scale	Kessler 10 Psychological Distress Scale
NATSINSAP	National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan
NHS	National Health Survey
NHMRC	National Health and Medical Research Council
OECD	Organisation for Economic Cooperation and Development
SD survey	Social Determinants survey
US	United States of America

US 18-item Module	United States Department of Agriculture 18-item household food security survey module
mUS 18-item Module	modified United States Department of Agriculture 18-item module
USDA	United States Department of Agriculture
US FSP	United States Food Stamp Program
US NHANES	United States National Health and Nutrition Examination Survey
WFD	World Food Programme
WHO CSDH	World Health Organisation Commission on Social Determinants of Health
WHO	World Health Organisation

## **CHAPTER 1**

### **INTRODUCTION**

#### **‘Setting the Scene’**

This chapter provides an overview of the literature that has informed my study. Chapter 1 is structured by sections that detail the current global food security situation; through to defining food security and insecurity, and how these definitions of food security at the household level have relevance to this study; how and among which populations food insecurity has been measured; interventions undertaken at population levels; factors that influence and impact on food insecurity; the effects of food insecurity on families, in particular child health outcomes and lastly, what is known within the Australian context, identified gaps, and how my study adds to the current knowledge base.

## **1.1. Background**

To date, an estimated 795 million people worldwide are undernourished of which 780 million live in developing regions (FAO, IFAD and WFD 2015). The prevalence of undernourishment has decreased from 18.6% in the early 1990's to 10.9% in 2014-2016 and therefore, the overall estimated prevalence is 12.9% (FAO, IFAD and WFD 2015 p.17). However, this figure is still high and approximately 3.1 million children less than 5 years of age die each year from under nutrition (WHO 2015). In 2011, these deaths accounted for almost 45% of total child deaths (Black et al., 2013). The ill effects of undernourishment and food insecurity on cognitive and physical development, growth and functionality in children and adolescents are well known (Black et al. 2013; Gunderson and Kreider 2009; Ashiabi and O'Neal 2008; Cook et al. 2008; Cook et al. 2006; Cook et al. 2004; Cook et al. 2002; Weinreb et al. 2002; Duncan et al. 1993) and long term effects result in poor health outcomes in adulthood (Black et al., 2013). The causes of child malnutrition, specifically undernutrition, are well known and documented. The quantity and quality of actual resources (human, economic and organisational) and way they are controlled; inadequate maternal and child care practices; insufficient access to food; poor water, sanitation and inadequate health services; inadequate dietary intake; and disease, are the main factors that impact child malnutrition, death and disability. (UNICEF, 1998)

Understanding the intricacies of the direct and indirect causes of food insecurity within populations, particularly those at highest risk is vital in addressing the problem and in improving the development of children and opportunities for their

future. Within the Australian context, some population groups have higher risk for food insecurity. These population groups include, Aboriginal and Torres Strait Islander peoples, the unemployed, single parent households, low-income and refugees (ABS 2015; Markwick et al. 2014; Foodbank Australia 2012; King 2012; Rosier 2011; Ramsey et al. 2011; Temple 2008; Gallegos et al. 2008; Nolan et al. 2006; Burns 2004). Therefore, food security at the household level, in particular within urban families with young children aged between 6 months and four years, is the focus of this PhD thesis.

To begin to understand what food security is and means, it must first be examined as a concept at the international, national, community and household levels. The various definitions are explored in the following section for one to be decided upon as a ‘best fit’ for this thesis.

## **1.2 Overview of food security and food insecurity**

The concept of food security did not originate until the mid-1970’s and evolved from discussions at a time when the focal point was on international food problems and the global food crisis (FAO 2003). During this time, the primary focus was on food supply issues including guaranteeing availability of supply and stabilising basic food prices (FAO 2003). This is also reflected in the international and institutional concerns of food supply that echoed the change in the organisation of the global food economy that further hastened the crisis. To bring a sense of stability to the increasing problem, international events lead to the 1974 World Food Summit and resulted in organised arrangements for food security information, promotion and

discussion on policy issues (FAO 2003 p.25). An outcome of the 1974 World Food Summit was a food security definition that directly reflected global concerns. This led to one of the original definitions of food security:

*“...availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices”* (United Nations 1975 in FAO 2003:27).

Overtime, it became evident there was more to addressing food insecurity than ensuring an adequate and sustainable food supply. Attention shifted from ensuring food security at a country level to include regional and community levels. To ensure food security exists at the national, regional, community, household and individual levels certain elements or ‘food security determinants’ must be in place. The FAO World Food Summit in 1996 (FAO 1996) stated food security is built on three pillars: *Food availability*, sufficient quantities of food available on a consistent basis; *food accessibility*, having sufficient resources to obtain appropriate foods for a nutritious diet; and *food utilisation*, appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

### **1.2.1. Defining Food Security**

Food security is complex with diverse meanings. The understanding, definition and interpretation of food security have undergone much deliberation to the point where it can be summarised as:

*“a multi-faceted concept, variously defined and interpreted. At one end of the spectrum food security implies the availability of adequate supplies at a global and national level; at the other end, the concern is with adequate nutrition and well-being”* (FAO 2003:3).

The global definition of food security involves the world food supply including, food production, processing and trade (exports and imports). An aspect of global food trade is to ensure broad distribution of food supply for reasons such as the prevention of food shortages. However, having a reliable and continual food supply that can cope with population demands at the international and national levels does not necessarily ensure food security at the regional and household levels. Therefore, later definitions reflected the complexity of food security as a multi-layered concept that not only included a global perspective, but also national, regional, household and individual level perspectives (FAO 2003; Anderson et al. 1990; ADA 1998). Over time, other elements of food security have been introduced into the definition and have included vulnerable people having physical and economic access to basic foods needed (FAO 2003). Associated determinants of chronic and acute food insecurity such as poverty, low incomes and episodes of intense pressure (conflict, natural disasters and economic collapse) have also been included (World Bank 1996).

Additional elements of the evolving definition associated food with health. It also included the relationship between the importance of obtainable nutritious foods for good health, as reflected in the statement ‘access at all times to enough food for an active, healthy life’ (World Bank 1986 in FAO 2003). Anderson and others drew on this definition and defined food security to include food access, ensuring food is

acquired in a socially acceptable way and that food is nutritious to meet health requirements (Anderson et al., 1990). This definition is now more broadly accepted and was adapted by the American Dietetic Association (ADA) in 1998 as:

***“Access by all people, at all times to sufficient food for an active and healthy life. Food security includes at a minimum: the ready availability of nutritionally adequate and safe foods, and an assured ability to acquire acceptable foods in socially acceptable ways”*** (ADA 1998:337).

For purposes of my thesis, which focuses on food security at the household level, I use the American Dietetics Association (1998) definition that describes food security to be a state where all people at all times have access to sufficient nutritious and safe food for an active and health life; and that food acquisition is guaranteed in a socially acceptable way. This definition encapsulates the food security determinants, access to and availability of food with emphasis on the importance of nutritious and safe foods to sustain health and wellbeing. Another important aspect is acquiring food in ways where independence is not compromised and food acquisition is not reliant on accessing food assistance programs or engaging in desperate measures that are illegal or compromise health.

Does food insecurity equate to ‘not being food secure’? Unlike the discussions on food security, defining food insecurity has not had as lengthy a deliberation. In instances where it is defined, the interpretation is that of the opposite of food security. The most recent broadly accepted definition of food insecurity is that of the



Food and Agricultural Organisation of the United Nations (2003). This definition of food insecurity is used for my thesis:

*“..existing when people do not have adequate physical, social or economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life”* (FAO 2003 p.29).

### **1.3. Experiences of household food security in developed nations**

#### **1.3.1. The international experience**

Historically, food insecurity within the United States of America (US) has been recognised as a problem among certain population groups for decades and Governments have responded to this issue through formal acknowledgement. In the 1980's, the President's Task Force on Food Assistance examined food assistance programs and claims of hunger existing within the populations. This led to understanding hunger as being a complex issue and a need to develop hunger measures to understand the extent of the problem (Bickel et al. 2000).

It was also during this time that non-government groups had, or were in the process of, developing measures to assess food security and hunger at the household level. These measures were used predominantly in families with young children. The Community Childhood Hunger Index Project (CCHIP), was sponsored by the advocacy organisation Food Research and Action Centre and the research component of this project was carried out at Cornell University Division of Nutritional Sciences

as CCHIP had developed, tested and validated a measurement instrument for hunger and risk of hunger among children of low income families (Carlson et al. 1999). During this period, Radimer et al. (1990) was undertaking doctoral studies with the Cornell University Division of Nutritional Sciences and through qualitative work developed measures to assess the hunger experiences of women within a low socio-economic setting. Findings showed the hunger experience ranged from going without food with the physical sensation of feeling hunger to individual and household hunger experiences. An outcome of Radimer et al.'s (2002) work was the development of and validated Radimer-Cornell 13 item measure of hunger and food insecurity.

In 1990, an act of Congress resulted in the establishment of the US National Nutrition Monitoring and Related Research Program and this was followed by the formation of the National Nutrition Advisory Council (Bickel et al. 2000). Included within this program was a 'Ten-Year Comprehensive Plan' and a key task was to develop a standard food insecurity and hunger measure for use at the national, state and local levels (Bickel et al. 2000). The development of such a measure commenced in 1992 and both CCHIP and Radimer-Cornell 13 item measure of hunger and food insecurity informed the development of the new measure (Bickel et al. 2000; Radimer 1992). The new measure was tested and refined, and in 1995, the Food Security Supplement comprising a series of 70 questions inclusive of the United States Department of Agriculture Household Food Security Survey Module (US 18-item Module, was included in the United States Current Population Survey-Food Security Survey (CPS-FSS) and has been so every year since (Bickel et al. 2000). The Food Security Survey Module, a numerical food security scale and

related categorical food-security-status measure, was developed to describe the food security status of US households during the preceding 12 month period (Bickel et al. 2000).

Household food security studies have been undertaken in both developing and developed nations. Through a review of the literature, most research studies with relevance to my study have been undertaken within developed western nations in the US (Anater 2011; Stevens 2010; Gunderson and Kreider 2009; Gunderson et al. 2008; Cook et al. 2008; Ashiabi and O'Neal 2008; Cook et al. 2006; Cook et al. 2004; Quandt et al. 2004; Kaiser et al. 2003; Kempson et al. 2003; Hoisington et al. 2002; Cook et al. 2002; Weinreb et al. 2002; Derrikson et al. 2000; Ahluwalia et al. 1998; Radimer et al. 1992) and Canada (Chan et al. 2010; Egeland et al. 2010; Ford et al. 2009; Ricciuto et al. 2007; Hamelin et al. 2002; Vozoris and Tarasuk 2003; Tarasuk 2001). These studies indicate that household food insecurity is a real lived experience for population groups within developed countries and that there are identifiable groups that are more susceptible to food insecurity than others. Most research undertaken within the US and Canada has purposely sampled and recruited through food assistance agencies and programs frequented by identified food insecure individuals and families (Ford et al. 2012; Stevens 2010; Cook and Frank 2008; Chan et al. 2006; Hamelin et al. 2008; Martin et al. 2004; Kaiser et al. 2003; Hamelin et al. 2002). These studies have identified common features that have influenced household food security; low income (Stevens 2010; De Marco et al. 2009; Cook and Frank 2008; Hamelin et al. 2008; Quandt et al. 2004; Martin 2004), employment status (De Marco et al. 2009; Martin et al. 2004; Quandt et al. 2004; Kaiser et al. 2003; Hamelin 2002), education levels (Hamelin et al. 2002; Stevens

2010; Martin et al. 2004) and the number of young non-school aged children within the household (Stevens 2010; Hamelin 2008; De Marco et al. 2009; Quandt et al. 2004). This last point has been associated with the capacity to undertake paid work, as employment can be dependent on child care availability and affordability.

### **1.3.2 Understanding the Australian food security experience**

#### ***1.3.2a National data***

Like other developed nations, the Australian community is not immune from the experiences of food insecurity. Within the Australian context, food security has been relatively under explored. Available literature suggests food insecurity is a real experience for certain population groups within Australia and the current national prevalence, based on the Australian Bureau of Statistics (ABS) Australian Health Survey results 2011-12, is estimated at 4% based on the proportion of respondents reporting to run out of food and not being able to afford to buy more within the previous 12 months<sup>1</sup>. As previously mentioned, the prevalence of food insecurity has been estimated to be much higher for specific at risk groups; 23% each for unemployed and single parent households, low income (20%), rental households (20%) and young people (15%) (Rosier 2011; Burns 2004). A study (Gallegos et al. 2008) undertaken within a newly arrived refugee (< 12 months) population found the food insecurity prevalence to be as high as 71%. The Indigenous Australian population is also considered at risk of food insecurity and results from the most recent Australian Aboriginal and Torres Strait Islander Health survey 2012-13,

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<sup>1</sup> 4364.0.55.009 - Australian Health Survey: Nutrition - State and Territory results, 2011-12 Latest ISSUE Released at 11:30 AM (CANBERRA TIME) 10/06/2015 First Issue

reported 22% of persons reported to live in a household that ran out of food in the past year and could not afford to buy more (ABS 2015) and of this percentage, a further 41% reported going without food (AIHW 2015). When distinguishing between remote and non-remote dwellers, 31% of remote dwellers reported living in a household that had run out of food compared with 20% for non-remote (ABS 2015).

Although other studies have described prevalence, the methods on how it was measured make comparisons problematic. For example, Nolan and colleagues (2006) found the prevalence of food insecurity to be 21.9% as assessed with the US 16-item Module (essentially the same as 18-item version with first two questions used as screeners) and 15.8% when assessed using the two item Australian measure (Nolan et al. 2006). At a national level, population based surveys have included either one or two food security questions asked of participants 18 years of age and over. The 1995 National Nutrition Survey (ABS 1997) was the first national Australian population based survey to request food security information of individuals aged 16 years and over and the question asked was: *“In the last 12 months, were there any times that you ran out of food and couldn’t afford to buy more?”* This single item measure was repeated in the 2001 National Health Survey. Food insecurity prevalence estimates derived from these two surveys are not comparable with subsequent surveys as questions were revised to include information about additional household members: *In the last 12 months, was there any time when you (or members of this household) ran out of food and couldn’t afford to buy more (Yes/No response). If positive response: When this happened, did you (or members of this household) go without food? Yes/No response.*

Published peer reviewed food security studies undertaken within the Australian context are few. Appendix 1.1 provides a current summary of Australian food security studies at the time of writing my thesis.

Nevertheless, national surveys provide the opportunity for comparing across surveys and potential for monitoring reported food security over time. However, there are sensitivities in obtaining information about food insecurity from individuals as there is potential for underreporting due to social stigma or suspicion of potential negative repercussions.

Other data on prevalence can be gleaned from non-government agencies. A 2012 report by Foodbank Australia (2012) revealed mounting pressure in Australia on charity organisations to meet increasing demands of providing basic necessities such as food, clothing and shelter. Approximately 75% of charity users were low income families, just under 70% unemployed and a little over 65% single parent families (Foodbank 2012). The next highest user group were people with a mental illness at just under 40%. Food parcels (almost 80%) were the most common form of assistance sought and provided for the reason that basic ingredients to make meals were required by households with the types of food requested tending to be staples such as bread, milk, grains, fruit and vegetables. Unfortunately, demand exceeded supply and nearly 90% of agencies reported not having enough food to meet total demand (Foodbank Australia 2012).

Anglicare Australia (King et al. 2012) too has undertaken a national review of their Emergency Relief clients. A survey was administered through face to face

interviews with a total of 590 participants from sixty-three sites across all states and territories over a six week period and included socio-demographic, food security questions and coping strategies. To capture food insecurity, the US 18-item Module and the food insufficiency question from the ABS National Health Survey were used to collect information about food insecurity prevalence and severity of food insecurity experienced. Questions were asked within the previous 3 months timeframe.

Findings were that 90% of adults experienced some form of food insecurity with 76% identified as severely food insecure and of concern, 79% of children were experiencing food insecurity with 36% identified as severely food insecure (King et al. 2012). The main contributors to food insecurity were low income, unemployment, private rentals and homelessness (including temporary accommodation arrangements), single parents and sole person households and being Indigenous Australian. The impact of food insecurity on adults were experiences of anxiety about running out of food, hunger in reducing meal sizes or going without food to feed children as well as feelings of anger, shame and isolation. In children experiences ranged from feelings of being grumpy, upset and embarrassed to not being able to concentrate at school and behavioural problems such as aggression, hyperactivity and anxiety as well as passivity (King et al. 2012). Other experiences for children were not being able to have friends over as there is no food to share and missing days of school as no or limited food for lunch boxes (King et al. 2012). Also reported by participants were limited access to food due to unexpected expenses, such as car maintenance, bills, health issues, school expenses and cost of healthy food. Another issue raised was not having a working fridge or stove and

power disconnections. Other than seeking Anglicare Emergency Relief services, the main coping strategies used were: adults go hungry to feed children, put off paying bills or extend the due date, buy cheaper brand foods and cheaper carbohydrate based foods, such as rice and pasta, or seek help from family (King et al. 2012).

The issue with measuring food security is further discussed in section 1.6.

### ***1.3.2b Data relating to specific groups***

Studies to determine the extent of food security among different populations within Australia is limited (Markwick et al. 2014; Russell et al. 2014; Adams et al. 2012; Law et al. 2011; Ramsey et al. 2011; Foley et al. 2009; Temple 2008; Gallegos et al. 2008; Nolan et al. 2006; Quine and Morrell 2006; Temple 2006; Radimer et al. 1997). A summary of the referenced studies are detailed in Appendix 1.1. Within, these population specific studies, reported are different levels of food insecurity to the national level reported by the Aboriginal and Torres Strait Islander Health Survey (ABS 2015). Other than Temple (2008), Foley et al. (2009) and Radimer et al. (1997), these studies have been undertaken within known vulnerable populations and there is potential for the estimated prevalence rates of food insecurity to be higher within these populations as a result of oversampling of food insecure participants. However, a study by Quine and Morrell (2006) was undertaken within a population considered vulnerable of independent living older Australians aged  $\geq 65$  years. Food security was assessed by the single Australian item '*In the last 12 months, were there any times that you ran out of food and couldn't afford to buy more?*' Findings



indicated 2% of this population were assessed as food insecure (Quine and Morrell 2006).

With most vulnerable populations groups, an assumption is a relationship between low income and food security status and therefore, low income populations are more likely to experience food insecurity. Several studies have investigated factors that influence food security, such as income, access to and affordability of food (Markwick et al. 2014; Russell et al. 2014; Ramsey et al. 2011; Foley et al. 2009; Temple 2008; Nolan et al. 2006; Temple 2002).

For instance, Nolan et al (2006) examined the prevalence of food insecurity in an urban population of social disadvantage in readiness for a local health promotion response within three low socio-economic locations in South-Western Sydney. Food insecurity was assessed using the single-item measure used in the 1995 National Nutrition survey, *“In the past 12 months, were there any times that you ran out of food and couldn’t afford to buy more?”* and the 16-item version of the US 18-item Module. A total of 1,717 participants were interviewed and the prevalence of food insecurity as measured using the single-item measure was 15.8% (95% CI 14.1-17.5); lower than the 21.9% (95% CI 20.0-23.8) reported using the 16-item version of the US 18-item Module measure. The authors’ concluded the single-item Australian tool was more specific (96% specificity) but less sensitive (56.9% sensitivity) than the 16-item US tool (Nolan et al. 2006).

Two further publications relevant to the food insecurity literature in my thesis' target population are that by Radimer et al. (1997) and Temple (2006) studies. Radimer et al.'s (1997) research focussed on three items (1) Describing the prevalence of reported food insufficiency in various subgroups in 13 regions across Queensland among a sample size of 10 451 households using two items:

- *In the last 12 months were there times that your household ran out of food and there wasn't money to buy any more food?*
- *In the last 12 months, has anyone in your household eaten less than they should because you couldn't afford enough food?*

(2) Investigating the association of food insufficiency with socio-demographic factors; and (3) Undertaking preliminary validation of food security measures by comparing with reported nutritional and health data. A strength of this study (Radimer et al. 1997) were the number of study sites. The authors' found that households in major cities tended to experience food insufficiency more (11.4%) than households in rural cities (8.5%) and rural non-cities (7.2%) (Radimer et al. 1997). Unemployment was strongly associated with food insufficiency. Food insufficiency prevalence was also higher in women (compared with men) and in the younger (compared to older) participants.

Temple's research involved the reanalysis of two national data sets to examine food insecurity prevalence and associated factors. The first being an analysis of data from the 2001 ABS National Health Survey for older Australians aged 55 years and above (Temple 2006). The measure of food insecurity used was: *"In the last 12 months,*

*were there any times that you ran out of food and couldn't afford to buy more?"*

Temple (2006) reported that 2.8% of older Australians aged  $\geq 55$  years were estimated to be food insecure. Those in low-income households experienced a higher prevalence (3.84%) compared with those on higher incomes (0.87%). Food security status was also associated with wellbeing where the food insecure self-reported poorer health (24.19%) when compared with the food secure (14.69%) and experienced a greater number of longer term health conditions ( $b=0.36$   $P<0.001$ ) (Temple 2006). Living arrangements impacted on food insecurity and couple households were (0.74% CI 0.47-1.14) less likely to experience food insecurity compared with lone females (3.79% CI 2.69-5.32) and lone males (3.82% CI 2.62-5.54). The food insecure also tended to report feeling terrible (8.06%), unhappy (9.68%) or dissatisfied (12.10%) with their lives when compared with the food secure (1.15, 2.30 and 2.70%, respectively) (Temple 2006).

The second analysis by Temple (2008) was on food security data collected through the ABS 2004/05 National Health Survey. Respondents aged  $\geq 18$  years were asked the following food security items: *"In the past twelve months were there any times when you ran out of food and couldn't afford to buy any more?"* and *"When this happened did you go without food?"* Three categories of food security were used: Food secure if responded yes to the first question; moderately food insecure if responded yes to the first question and no to the second; and severe food insecurity if responded yes to both questions. Findings showed approximately 5.1% of Australians have experienced food insecurity within the past 12 months. Of those identified as food insecure, approximately 60% were moderately food insecure and 40% severely food insecure (Temple 2008).

Within the Australian context, highlighted is variability in food insecurity prevalence based on the chosen measure. When compared with the two item Australian measure, the US 18-item Module has potential to contextualise the experience of food insecurity within the Australian population according to prevalence as well as severity among household members. Severity of food insecurity was not the focus of my study, though the food insecurity prevalence within the two study populations are investigated within my thesis and compared with national estimates in Chapters 4 and 7.

### **1.3.3 The Indigenous Australian population experience**

Research that has been undertaken in Indigenous Australian populations is limited and prior to the commencement of my PhD (2008) there were no known published studies on household food security in Indigenous Australians. Though, more recently a number of studies have been published. For instance, Markwick et al.'s (2014) focus was food insecurity within Aboriginal and Torres Strait Islander people in urban and rural settings in the state of Victoria and the purpose was to 'Explain the relationship between food insecurity and Aboriginal and Torres Strait Islander status'. Data pertaining to food insecurity status socio-demographic, geographic and lifestyle risk factors and social support was obtained from the cross-sectional 2008 Victorian Population Survey. The food security question used in this survey was: *'In the last 12 months, were there any times that you ran out of food and couldn't afford to buy more?'* Findings showed the prevalence of food insecurity was higher in Aboriginal and Torres Strait Islanders (20.3%) when compared with the non-Indigenous Australian population prevalence (5.4%). Factors that influenced this

higher prevalence in the Aboriginal and Torres Strait Islander sample were more likely to be a current smoker (AOR 3.8), be obese (AOR 4.9) of low-income (OR 3.9); inability to obtain assistance from family (OR 4.1), friends (OR 4.8) and neighbours (4.5); be a lone parent (OR 4.6) reside in a household with a child (4.4) and larger household size (4.6).

A qualitative study undertaken by Adams et al. (2012) in an urban Aboriginal community based in Geelong, Victoria used participatory action research and photo-voice to understand the community's meanings of food and food insecurity. This research involved collaborative partners (research and service delivery) whom had representation on the study reference group. Participants with existing food insecurity issues were recruited through an Aboriginal Community Controlled Health Organisation. The research outcomes of the photo-voice method identified that food selections were influenced by family harmony, collectivism and satiation of hunger through consumption of inexpensive high carbohydrate and fat foods. Adams et al. (2012) also found that participants had an understanding of what were healthy foods, but were not always able to afford these foods. Outcomes of the action research cycles were used to engage participants in the development of interventions and included an education resource of plates depicting healthy food portions, social cooking opportunities, development of a cooking television series and specialised cook-books (Adams et al. 2012).

The only known publication with a remote focus, undertaken at the community level as opposed to the household level, was that of Brimblecombe (et al. 2014).

Brimblecombe's (2007) Doctorate thesis investigated the problem of poor nutrition and factors influencing eating behaviour in a remote Northern Territory community and published qualitative findings from this Doctorate thesis showed participants understood the requirements for a healthy diet for both traditional and western food systems (Brimblecombe et al. 2014). Brimblecombe et al. (2014) highlighted financial constraints as a limiting factor that impacted on a healthy diet and within the remote community, food prices were high compounding the issue of inadequate household food storage and preparation facilities (Brimblecombe et al., 2014). The research outcomes are similar to that identified by Adams et al.'s (2012) study of the photo-voice method of which food selections were influenced by family harmony, collectivism and satiation of hunger through consumption of inexpensive high carbohydrate and fat foods in an urban community.

A study undertaken by Foley (2010) among an urban Brisbane Aboriginal population and investigated family food practices and experiences for those with diabetes or with a family member with the condition. The majority of participants were women responsible for food procurement and preparation. Participants indicated that making dietary changes were difficult and involved extra work with planning grocery lists within a restricted food budget, shopping, experimenting with new healthier meals. In trying new recipes, it was important meals were appreciated by the family to avoid complaints and food wastage and that the recipes were quick and easy to prepare. Failed meals sometimes had a negative impact on women's confidence and reluctance to further experimentation. A cultural consideration was having to share food and stretch meals with unexpected visitors. There were also issues with attending appointments with health professional and perception of being

dictated to about dietary changes and then judged if non-compliant. Others spoke of supportive nutrition promotion sessions that worked for them to make positive changes.

Two unpublished studies that involved Aboriginal and Torres Strait Islander populations were identified in my literature review. The first was undertaken by two Masters' students in the Darwin and Palmerston region of the Northern Territory and was part of a Northern Territory Government project to undertake a nutrition needs assessment of the urban based Indigenous population to assist with future planning of services to the Darwin and Palmerston areas (Northern Territory Government 1997). Information was requested from both service providers and Aboriginal and Torres Strait Islander community members. Identified by service providers was the need of support for further nutrition programs and initiatives with a focus on diabetes and healthy eating (Northern Territory Government 1997).

The second was on Indigenous nutrition issues in the greater Brisbane area. The project aimed to: 1) explore what nutrition projects had been undertaken within the greater Brisbane Aboriginal and Torres Strait Islander community; and, 2) present a holistic picture of issues affecting the nutritional health of this community; and 3) build relationships with key partners and peak agencies for future public health nutrition interventions (Queensland Government 2006:13). The study found that 78% of participating agencies provided some sort of service specifically for Indigenous Australians. Approximately 60% offered programs with some food or nutrition content and of the nutrition programs, 34.4% were health awareness or

health education programs and 26.6% were crisis or emergency relief services (Queensland Government 2006:17).

From the available literature, there is little available data about the experiences of household food insecurity among Indigenous Australian populations or what coping mechanisms and strategies are used to alleviate the problem. This is a gap in knowledge that my thesis addresses (Chapter 5).

#### **1.4 The context of food security within policies and reports**

Household food security issues have been linked to government policies. The Australian Food and Nutrition Policy (Commonwealth of Australia 1992) was the first national coordinated approach for food and nutrition policy implementation. The development of this policy stemmed from the Dietary Guidelines for Australians (NHMRC 1991) and recognised the value in an inter-sectoral approach to addressing food and nutrition concerns beyond nutrition education. Its development involved representation from public and private sectors, food manufacturing, agriculture, retailing, consumers and the media sectors. This policy recognised subgroups at risk of under-nutrition which included Aboriginal and Torres Strait Islander peoples, low-income households and rural Australians. The Policy Goal was:

*“To improve health and reduce the preventable burden of diet-related early death, illness and disability among Australians”* (Australian Government 1992).



State and Territory food and nutrition policies and other related initiatives were then formulated from this national framework.

The National Australian Food and Nutrition Policy (1992 – 2000) then informed the ‘Eat Well Australia (EWA)’ initiative, an agenda for action for Public Health Nutrition 2000 to 2010 (National Public Health Partnership, (NPHP 2001). EWA was developed by the then Strategic Inter-governmental Nutrition Alliance (SIGNAL) of the NPHP and included the National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan 2000 to 2010 (NATSINSAP) (NPHP 2001). This strategy and action plan included seven action areas, two of which have relevance to this study: i) *food security*; and ii) *socioeconomic status and nutrition issues in urban areas*. These areas specifically concern access to affordable food, quality food and transportation problems and difficulties in accessing family and community support particularly for urban populations (NPHP 2000:26-32). Both EWA and NATSINSAP are no longer in date and were not superseded.

The Australian Red Cross, the Dietitians Association of Australia and the Public Health Association of Australia have jointly prepared a ‘Food Security for Aboriginal and Torres Strait Islander Peoples Policy’ (2012). This policy is an advocacy document that calls on Australian Governments to work with Aboriginal and Torres Strait Islander peoples for sustainable food and nutrition security.

Considering the dearth of evidence regarding the food security experience of Indigenous Australians, one potential outcome of my thesis findings is to inform future policies. As nationally, the majority of Indigenous people live in urban settings and my studies in this thesis address issues about food security among Aboriginal and Torres Strait Islander peoples residing in Darwin and Palmerston areas (Chapters 4 and 5).

### **1.5 Perceptions and experiences of household food insecurity**

There are population groups within developed countries that experience food insecurity and to a certain degree, hunger. Strategies to overcome or alleviate experiences of food insecurity have been employed to overcome problems, but it is thought that most measures are short lived and become a ‘stop gap’ to temporarily relieve problems. The literature about people’s experiences with household food insecurity and coping strategies employed are limited and even more so within Indigenous populations. Presented here is a review of the literature to describe experiences of food insecurity at the household level and how coping mechanisms, if any, are engaged to overcome problems.

A number of studies on food security have been conducted among families with young children in the United States and Canada (Ford et al. 2012; Sim et al. 2011; Stevens 2010; De Marco et al. 2009; Hamelin et al. 2008; Chan et al. 2006; Quandt et al. 2006; Kempson et al. 2003; Hamelin et al. 2002; Hoisington et al. 2002). These studies indicate that although families are accessing food assistance programs, food shortages and hunger are still experienced. A food security study by Chan and

others (2006) in six Inuit communities of Nunavut, Canada, focussed on the availability and accessibility of traditional and market foods (i.e., foods purchased from a shop). Noted within a study by Chan et al. (2006) were inconsistencies between perceived food security status and experiences in obtaining enough food to eat. Whereas, a study undertaken by Ford et al. (2012) also within an Inuit population from Nunavut, found participants who reported food insecurity also reported regular use of community food programs to assist with alleviating hunger. This difference between the two studies may however, be due to sampling differences as Chan et al. (2006) recruited from the broader community whereas the study by Ford et al. (2012) recruited participants registered with food assistance programs.

Coping strategies, i.e. the mechanisms families have in place to cope with food and money problems, have been described in several studies. In a Quebec-based Canadian study on household food security by Hamelin et al. (2002), the coping strategies were adults reduced size of meals or forwent food so children could eat; modifying lifestyle, such as forego purchases of less essential items and delay payment of bills to free up money for food; purchase of sale item foods and foods close to use by date; and visit a food bank when desperate. Nolan et al. (2006) also investigated coping strategies of participants residing within South Western Sydney, Australia. If participants responded 'yes' to food insecurity, an additional question about coping strategies was asked. Nine strategies were provided to select from and of the nine, the most frequently reported was cutting down on the variety of household foods (59.1%), a parent or guardian skipping meals or eating less (58.8%) and putting off paying bills (57.4%) (Nolan et al. 2006:251).

Other forms of coping strategies have been reported. For instance, Hoisington and others (2002) reported coping strategies among a group of 90 food pantry users in Washington, USA that included participants of African American, Hispanic and Native American background. These coping strategies included putting off paying bills and of using up leftover food, making food in bulk and freezing food for later use (Hoisington et al. 2002). A study among Latino immigrant families in North Carolina, United States, also reported participants coped with times of food insecurity by limiting food purchases considered expensive, such as meats and fruits and unnecessary foods, such as sweet drinks and snacks, and eating out (Quandt et al. 2006). In other similar studies, shopping for specials, bulk-buying, cooking in bulk and freezing food portions are examples of other pragmatic responses (Stevens 2010; Quandt et al. 2006; De Marco et al. 2009; and Hoisington et al. 2002). Forgoing healthier food options and choosing cheaper less healthier foods, reducing meal size or going without to ensure children eat, are further examples of negative responses to food insecurity (Stevens 2010; De Marco et al. 2009; Hamelin et al. 2008; Quandt et al. 2006; Hoisington et al. 2002).

Social support systems in the form of food assistance programs, food charity organisations, faith communities, neighbours and friends (Adams et al. 2012; Ford et al. 2012; Sim et al. 2011; Stevens 2010; Chan et al 2009; De Marco et al. 2009; Hamelin et al. 2008; Quandt et al. 2006; Kempson et al. 2003; Hamelin et al. 2002; Hoisington et al. 2002) also provide important coping strategies for families experiencing food insecurity. Other studies have also identified the extended family as a social support system (Ford et al. 2012; Sim et al. 2011; Stevens 2010; Quandt et

al. 2006; Kempson et al. 2003; Hoisington et al. 2002). Others identified support from friends and neighbours as a main coping mechanism (De Marco et al. 2009) in response to food insecurity.

Only one study however, mentioned living with family as a temporary coping strategy until housing was obtained (Ford et al. 2006). Stevens et al. (2010) highlighted the aspect of reciprocity within these social support systems where young mothers would rely on family members for assistance with food and then ‘return the favour’ when family members experienced difficulties. Reciprocity is an important component of the social connectedness among Indigenous Australians (Broome 1994). This cultural practice of sharing among Indigenous Australians is important in maintaining and reinforcing cultural social bonds with individuals and groups (Broome 1994) and in imparting knowledge about good food as related to balance – life, resources, food, knowledge (Brimblecombe et al. 2014).

Chan et al. (2006) and Ford et al. (2012) have also noted reciprocity has a place in maintaining and reinforcing family and broader community relationship obligations as well as cultural identity and practice among the Inuit. ‘Cultural sharing’ (Chan et al. 2006) and ‘sharing networks’ (Ford et al. 2012) ensure that excess traditional food is provided to the more vulnerable members of the community who cannot obtain these foods. In these studies, for those who could not hunt, money or other services were exchanged for traditional foods to keep with continuing cultural practices (Ford et al. 2012; Chan et al. 2006). Similarly, in a study undertaken by Quandt et al. (2006) of Latino Immigrant Families in North Carolina, USA, money was sent home to families to support food security. This action was justifiable from the belief

family back in their country of origin were in a worse situation to their own and also that it was a cultural obligation to look after ones' parents (Quandt et al. 2006).

Amongst Indigenous Australians, there is no data on coping mechanisms used when food insecurity occurs within families. Obtaining such information is important as it will provide data on enablers that can inform policies to enhance these strategies and support families. Thus, within my series of work for my PhD, I conducted a qualitative study to explore the perceptions and experiences of household food insecurity among Aboriginal and Torres Strait Islander peoples residing in Darwin and Palmerston areas (Chapter 5).

## **1.6. Measuring household food security**

Within the developed nation context, most published literature describing approaches for the use of measuring and monitoring population based household food security are from the United States and Canada (Skinner et al. 2013; Willows et al. 2011; Huddleston-Casas et al. 2008; Gunderson et al. 2008; Tarasuk et al. 2007; Gulliford et al. 2006; Casey et al. 2006; Stuff et al. 2004; Vozoris and Tarasuk 2003; Radimer 2002; Tarasuk 2001; Bickel et al. 2000; Kendall et al. 1996). As described in section 1.3.1., within the US, food insecurity data is collected annually through the national US Current Population Survey Food Security Supplement (CPS-FSS) of which includes the US 18-item Module (Bickel et al. 2000; Radimer 2002).

The Australian National Nutrition Survey (1995) included a single question concerning individual/household food security: 'In the last 12 months, were there

any times that you ran out of food and couldn't afford to buy any more?' (ABS 1998). Single questions however, may not capture the many dimensions of food security. To my knowledge, the US 18-item Module has not been validated within Indigenous populations. Skinner et al. (2013) have evaluated the perceived relevance of US 18-item Module within an Inuit population and outcomes were, the measure did not capture a true representation of participants' situations and required inclusion of items that captured the high cost western foods and use of traditional food practices. Therefore, the application of the US 18-item Module within the Indigenous Australian population of Darwin and Palmerston was explored in this study (Chapters 3 and 4). The repeatability of the tool was tested within Stage 1 (Indigenous Australian population, Chapter 4) and Stage 3 (Child Care Centre sample, Chapter 7) using a test-retest process.

#### **1.6.1. Validation of the US 18-item household food security survey module in broader populations.**

The US 18-item module has been validated as a measure of household food insecurity in other populations, including Asian and Pacific Islanders in Hawaii (Derrickson et al. 2000), The Caribbean (Gulliford et al. 2006), Iran (Rafiei et al. 2009) and the Dominican Republic (Bezuneh et al. 2008). However, the method used for validation has differed across studies.

Derrickson et al. (2000) tested the reliability and validity of the measure with Asians and Pacific Islanders in Hawaii. To test reliability and validity, a convenience sample of 144 food pantry recipients were recruited and the retest consisted of 61 of

the original food pantry recipients. Interviews were conducted using a Computer Assisted Telephone Interviewing system using standard telephone survey methods and telephone interviewers experienced in calling households, were engaged to obtain data. Validity and reliability of the US 18-item Module (retest on average 11 days after the initial survey) using a goodness of fit statistical test, the Rasch statistical model, of which the likelihood of being food insecure is determined by the increasing number of positive responses to items. For interpretation of results, a 5% test of fit between the data of the group and the model was considered a misfit. The study concluded, that the module items were reliably scored, as a misfit in 4.7% of participants was found (Derrikson et al. 2000).

In another study, Gulliford and colleagues (2006) conducted a cross-sectional study to validate the US 18-item module within a Caribbean population. The US 18-item module and demographic questions were self-administered by parents' of school children aged 4-12 years. Questionnaires were obtained from 74% (N=3,858) of participants and categorised according to child's ethnicity; Afro-Caribbean (40%), Indo-Caribbean (40%), and Mixed, other and unknown (20%). Three analysis models were used based on item response theory, where adult responses were cross calibrated with child items; and both adult and child results were separately compared to the US CPS-FSS data (Gulliford et al. 2006). The results confirmed that the US 18-item Module was valid; able to distinguish between moderate and severe hunger categories; and was able to estimate the food security status of children and adults separately.



One study adapted the US 18-item Module and assessed the internal validity with adults and children in Iran (Rafiei et al. 2009). It was adapted to be administered as two separate modules; an adult scale comprising of 10 adult items and a children's scale comprising of 8 child items. A sample of 2004 randomly selected households comprised the sample with 990 of these households providing affirmative responses to the child-referenced items. Data were analysed using the Rasch statistical model and item calibrations were compared with those for corresponding items in the US CPS-FSS data (Rafiei et al. 2009). The overall fit of data was similar to the CPS-FSS. In households with children, cross tabulation of the adult and child were consistent and therefore, the authors concluded that the adapted US 18-item Module was an internally valid household level measure of food insecurity among adults and children in Iran (Rafiei et al. 2009).

The US 18-item Module has also been adapted and tested for use in the Dominican Republic (Bezuneh et al. 2008). The setting was an economically vulnerable rural community and a qualitative and ethnographic study was firstly conducted with focus groups to confirm the relevance of the concepts. The refined questions and outcomes informed appropriate modifications to create an adapted version of the US 18-item Module. Modifications regarding wording of the questions in Spanish were compared with Harrison et al.'s (2003) modified 18-item household food security module of which was translated into Spanish for use in the United States. The modified 18-item tool was piloted in 110 households. Using the Rasch analysis model for goodness of fit, results were high for some questions and low for others in both the adult and child items. The authors suspected that cognition variability accounted for these differences and recommended further cognitive testing for these

items (Bezuneh et al. 2008). Construct validity of the measure was assessed by examining its association with other collected data that potentially influenced food security status. Findings indicated food security in adults and children was associated with education status of adults and employment, particularly women's contributions to the family income. However, the authors recommended that further construct validity studies be undertaken with a larger more representative sample and that the adult and child items be considered separately (Bezuneh et al. 2008).

The US 18-item household food security survey module has been reviewed by an expert panel using a two-phased two-year study (Wunderlich and Norwood eds. 2006). The panel recommended that improvements were required in particular, revising of the wording and order of questions, consistency of reference periods, reference units, and response options across questions (Wunderlich and Norwood eds. 2006). The review panel also recommended that the revised questions reflect modern cognitive questionnaire design principles and new data collection technology and should be tested prior to implementation (Wunderlich and Norwood eds. 2006).

Within the Australian context, to my knowledge the US 18-item Module has not been tested for reliability. However, Ramsey et al. (2011) used the 16 items (similar to the 18-item Module) in an Australian population and measured the internal consistency of the scale and a Cronbach's alpha of 0.90 was achieved indicating acceptability of the scale in the study population (Ramsey et al. 2011). This is one of the first endeavours we are aware of to test the reliability of the 18-item module within an Australian population. The other studies described above (Rafiei et al.

2009; Bezuneh et al. 2008; Gulliford et al. 2006; Derrickson et al. 2000) that have adapted and/or validated the US 18-item module in other populations did not report on the Kappa coefficient, arguably the current standard for measuring test-retest (Altman 1991).

Given that the validity of the US 18-item module has not been examined in an Australian Indigenous population, my PhD work included determining its repeatability within the two study samples (Chapters 4 and 7).

## **1.7. Contributors to food security and food insecurity**

Given the likely links between social determinants and food security this section examines this association relevant to the population context of my studies in this thesis.

### ***1.7.1 Social Determinants***

Social determinants are variables that influence or determine individual or population outcomes, such as education, income, demographics, employment status, housing (Anderson et al. 2004). Within this thesis, social determinants are explored as ‘influential variables’ associated with household food security status. At the international level, the World Health Organisation (WHO) Commission on Social Determinants of Health published a report ‘Closing the Gap in a Generation, Health equity through action on the Social Determinants’ (CSDH 2008). In summary, this report considers the social determinants of health through a social justice lens and provides an agenda for action on health inequities with consideration to the three principles of action that are embedded in the overarching recommendations. These three principles of action are (CSDH 2008:3):

1. Improve the conditions of daily life – the circumstances in which people are born, grow, live, work and age.
2. Tackle the inequitable distribution of power, money and resources – the structural drivers of those conditions of daily life – globally, nationally and locally.

3. Measure the problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health.

Within the context of my thesis, these three principles are considered in relation to the impact of housing, education, employment and income on food security. Undertaking this may contribute to a better understanding of the social determinants experienced by the study population. However, the complex inter-relationships will not be the focus as it is beyond the scope of my studies.

Various studies have identified the complex inter-relationship between social determinants and food security at the levels of households and individuals. For instance, an adequate income to meet expenses and food needs is acknowledged as a requirement for food security (Stevens 2010; Quandt et al. 2006; Hamelin et al. 2002; Hoisington et al. 2002; Tarasuk 2001). The impact of the cost of living on food security has been explored in several studies (Stevens 2010; De Marco et al. 2009; Quandt et al. 2006). The participants of these studies have been either low income earners or recipients of welfare (government payments) and have received support through government and non-government food and nutrition assistance programs. Food insecurity was found to occur when money ‘ran out’ before the next pay period. Food and nutrition assistance was accessed at these times to alleviate food insecurity over the short term. Other important determinants identified are stable housing and housing tenure (rental v owner occupier). These have shown to positively influence food security for families (Stevens 2010) as has education and

employment status (Ford et al. 2012; Stevens 2010; De Marco et al. 2002). A study by Stevens (2010) in a United States urban centre, found the cost of home rental was the single biggest factor identified among a group of young mothers as contributing to food insecurity. This has been noted in similar studies where food insecurity exists in vulnerable groups with young children, where the primary carers are usually mothers who are unemployed (Ramsey et al. 2011) or underemployed<sup>2</sup> with a low-income and education attainment (Stevens 2010; Quandt et al 2006; Kaiser et al 2007; Kaiser et al. 2003). Other food security focussed studies, but not specifically in families with young children, have also identified under or unemployment, low income and education attainment as associated with food insecurity (Anater et al. 2011; De Marco et al. 2009; Foley et al. 2009; Nolan et al. 2006; Martin et al. 2003; Hamelin et al., 2002; Radimer et al. 1997).

Seasonal employment (De Marco et al. 2009 and Quandt et al. 2006), unemployment and underemployment (Sim et al. 2011; Stevens 2010; Ford et al. 2012; Hamelin et al. 2008; Chan et al. 2006; Hamelin et al. 2002; Hoisington et al. 2002) have all been reported as problematic in ensuring a regular income to afford food and other expenses among those experiencing food insecurity. Chan et al. (2006) similarly observed that the cost of living and cash flow among the ‘working poor’ negatively impacted on their food security in Nunavut communities. Quandt et al. (2006) found that among Latino immigrant families within North Carolina, United States, not having enough food was cyclical and related to a decrease in income due to limited availability of paid work (seasonal work).

As previously stated, Temple (2006) reported that income level was associated with food security status in older Australians although geographical location, education attainment levels, country of birth or employment status were not (Temple 2006). A report compiled by Foodbank Australia (2012), indicated for the financial years from 2003–04 to 2009-10 that although there was an average net household wealth increase of 28%, not all Australian households experienced this; as the poorest 20% of households only increased their household net wealth by 4% within this time period (Foodbank Australia 2012 based on ABS 2011a data). The cost of electricity had increased by 54%, rent 33% and food 24%, while disposable incomes of low economic households had risen by 20% (Foodbank 2012).

The Australian study by Nolan et al. (2006) found four predictors that were strongly associated with food security: capacity to save, presence of children (< 18 years of age) in the household, housing tenure and respondents' reported health status. Findings indicated that households without savings were five times more likely to be food insecure than households with savings (AOR=5.05; 95%CI: 3.0-7.10); families renting were nearly three times more likely to be food insecure when compared with those who owned or had mortgages (adjusted OR=2.77; 95%CI: 1.81-4.24); and households with children less than 18 years of age were more than twice as likely to be food insecure than households with no children (adjusted OR=2.13; 95%CI: 1.53-2.96); and respondents reporting poor health were about twice as likely to be food insecure than those reporting good health (adjusted OR=2.03, 95%CI: 1.48-2.78). Participants ranked local food production, improved transportation to food outlets and health education on food and nutrition as preferred strategies to help overcome food insecurity (Nolan et al. 2006).

Another Australian study undertaken earlier than Nolan's, was that of Radimer et al. (1997). Within this study, also found was employment status to be strongly associated with food insufficiency, with the unemployed experiencing the highest prevalence of food insufficiency for households (27.3%) and individuals (21.0%) compared with the overall food insufficiency prevalence being 9.7% for households (95%CI 9.1-10.3) and 6.4% for individuals (95%CI 5.9-6.9). Other associations with a higher prevalence of food insufficiency were; those undertaking home duties (households 12.8% and individuals 8.1%); students (households 15.2% and individuals 11.6%); and those in shared accommodation (households 22.3% and individuals 16.3%) (Radimer et al. 1997).

### **1.7.2. Determinants of Food Security**

As mentioned in section 1.2, the three pillars of food security are: food is available, accessible and able to be utilised (FAO 1996). This provides a framework to consider the determinants of food security such as that developed by Rychetnik et al. (2003) (Figure 1.1) and informed chapters 4 and 7 of this thesis that explore the factors influencing food security. The model considers the factors influencing food security with regards to i) the supply of food; and, ii) food access. Food access includes the ability to get to food outlets, having the knowledge, skills and preferences to make healthy food choices within a budget; having food storage, preparation and cooking facilities to ensure ability to bulk buy food and facilities to store food safely as well as to prepare and cook food; and lastly, having the time and physical mobility to access food as well as to prepare and cook food and to have the social supports or networks for assistance if required. These supports can be

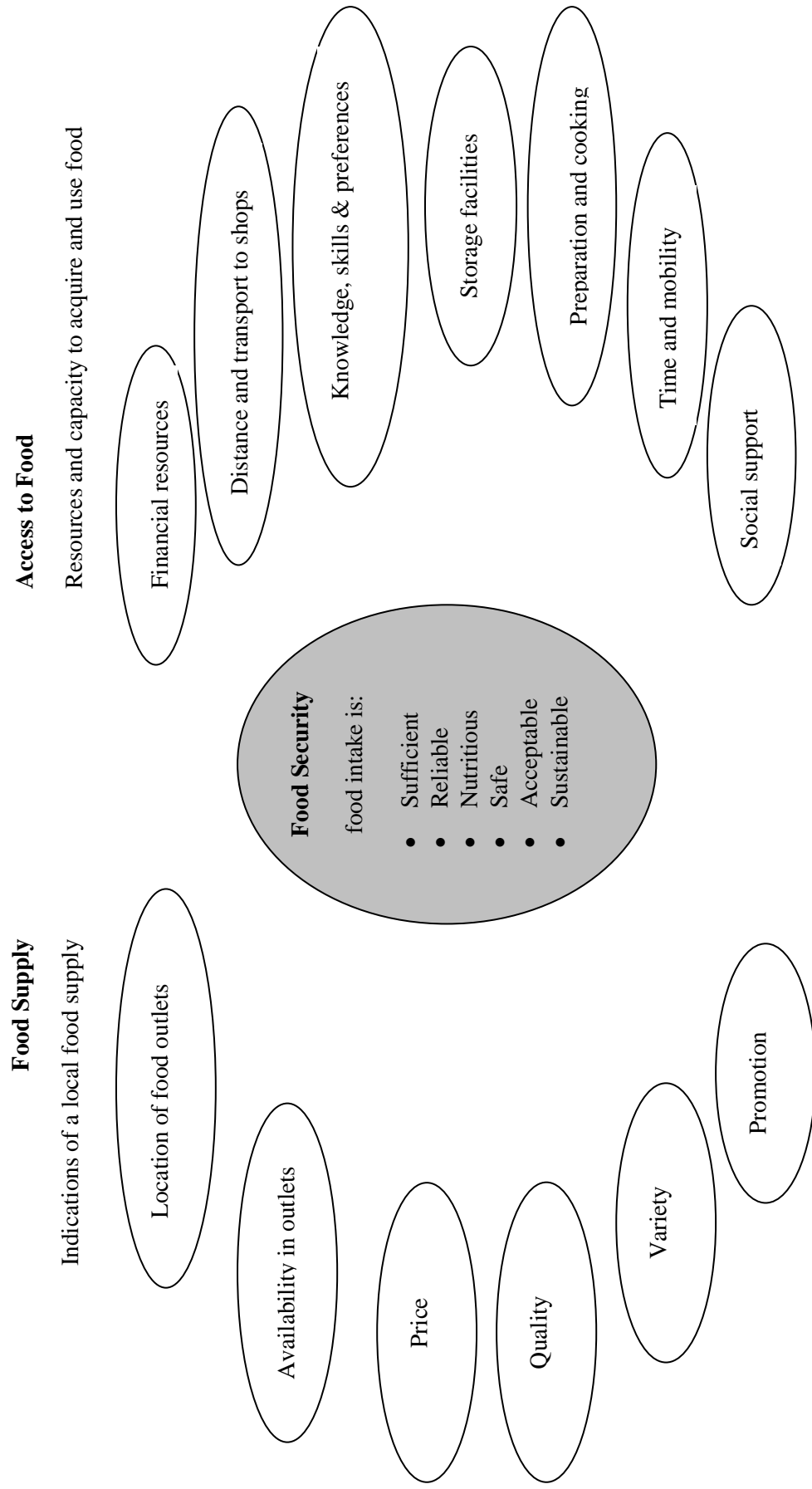


relatives and friends or agencies that provide assistance with the ability to obtain and prepare food.

As aforementioned, food access is a factor that influences food security and includes food storage and preparation. Two Australian studies undertaken within the Aboriginal and Torres Strait Islander population, investigated kitchen functionality as an enabler for good nutrition (Torzillo et al. 2008; Bailie and Runcie 2001). Both studies found kitchen functionality to be suboptimum, as Torzillo et al. (2008) reported only 6% of households met the criteria for improving nutrition through functional nutrition hardware and Bailie and Runcie (2001) identified kitchen benches (26%), stove tops (41%) and the ovens (42%) were the least functional or not present.

Participants of the study conducted by Nolan et al. (2006) identified improved transportation to access food outlets as an important strategy to address food insecurity. Studies undertaken within the US have identified that restricted access to larger grocery stores (supermarkets) where a better range of cheaper foods are stocked, has been due to limited access to a private car. In these instances, participants tended to access food outlets within their local area and these were more expensive (Stevens 2010; De Marco et al. 2009; Clifton 2004). Other studies have also noted the importance of use of a private vehicle, particularly where public transport was considered by participants as unreliable, inconvenient or expensive and therefore, found to negatively impact on food security (Stevens 2010; De Marco et al. 2009; Coveney et al. 2009; Kempson et al. 2003; Martin et al. 2003).

**Figure 1.1**      **Determinants of Food Security Model (Rychetnik et al. 2003 adapted from McComb, Webb and Marks 2000)**



## **1.8. Wellbeing (Psychological Distress) and its measurements**

An aspect of food insecurity is the association with wellbeing issues (Carter et al. 2011; Temple 2008; Huddleston-Casas et al. 2008; Temple 2006; Casey et al. 2006; Casey et al. 2004; Kaiser et al. 2004; Stuff et al. 2004; Vozoris and Tarasuk 2002; Tarasuk 2001; Siefert et al. 2001). Feelings of low self-worth and uselessness in response to a perception of not being able to provide for their children as a result of their current circumstance, have been shown to exist in association with food insecurity (Quandt et al. 2006; Hamelin et al. 2002). Thus, my thesis includes exploring the association between food security status and the wellbeing of the primary care givers of children (Chapters 4 and 7). To examine well-being, an appropriate measurement tool is required.

### ***1.8.1. Kessler 10 Distress Scale (K10)***

One of the more acceptable and validated depression screening tools used internationally is the Kessler 10 Psychological distress scale or K10. This screening tool was first developed for use in the United States National Health Survey by Professor Ron Kessler and Dan Mroczek 1992<sup>2</sup>. The K10 is a simple measure of psychological distress and can be used to monitor progress following treatment for common mental health disorders such as anxiety and depression (National Transport Commission Australia 2006). Within Australia, the K10 has been used by the Australian Bureau of Statistics in national health and wellbeing surveys for the general population as well as with Aboriginal and Torres Strait Islander populations

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<sup>2</sup> (4817.0.55.001- Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, Australia, 2007-08)

between 1997 and 2010<sup>3</sup>. The 2011-2012 Australian Health Survey<sup>4</sup> revealed that 13.6% of Australians reported having a mental or behavioural condition and was more common among women (15.1%) than men (12.0%)

The K10 has been modified, tested and refined for use in the Aboriginal and Torres Strait Islander population by a Menzies' project (AIMhi NT, Australian Integrated Mental Health Initiative in the Northern Territory led by Nagel and Griffin (nee Thompson) (Nagel T et al. 2009). This version of the K10 has been shown to be reliable with this population and thus I used this modified version in my studies and reported in this thesis (Chapters 3 and 4).

### **1.8.1 Psychological distress and relationship with food security status.**

The 2011-2012 Australian Health Survey findings showed that those who reported food insecurity experienced high levels of psychological distress (23.1%) compared with food secure participants (10.5%)<sup>5</sup>. Other studies that related psychological distress and/or wellbeing levels with food security status have also shown similar findings (Carter et al. 2011; Temple 2008; Huddleston-Casas et al. 2008; Temple 2006; Casey et al. 2006; Casey et al. 2004; Kaiser et al. 2004; Stuff et al. 2004; Vozoris and Tarasuk 2002; Tarasuk 2001; Siefert et al. 2001). Temple (2008) reported that 23% of the severely food insecure group reported feeling depressed most or all of the time when compared with 15% of the moderately food insecure and

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<sup>3</sup> (Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, Australia 2001).

<sup>4</sup> 4364.0.55.001 - Australian Health Survey: First Results, 2011-12 PREVIOUS ISSUE Released at 11:30 AM (CANBERRA TIME) 29/10/2012 First Issue

<sup>5</sup> 4364.0.55.009 - Australian Health Survey: Nutrition - State and Territory results, 2011-12 Latest ISSUE Released at 11:30 AM (CANBERRA TIME) 10/06/2015 First Issue

4% of the food secure (Temple 2008:660). Associations with psychological distress and wellbeing levels and food insecurity have been shown for those with a low income (Carter et al. 2011; Huddleston-Casas et al. 2008; Kaiser et al. 2007; Casey et al. 2006; Stuff et al. 2004; Vozoris and Tarasuk 2003; Seifert et al. 2001) and low education attainment (Carter et al. 2011; Huddleston-Casas et al. 2008; Kaiser et al. 2007; Casey et al. 2006; Seifert et al. 2001).

Findings from other studies have also identified associations between food insecurity and wellbeing, particularly in primary care givers of young children. A US study undertaken in a low-income adult population found that food insecure adults (compared with the food secure group) had significantly ( $<0.0001$ ) poorer physical or mental health status (Stuff et al. 2004). Another US study described the bidirectional causal relationship between food insecurity and maternal depression, ( $p=0.034$  for causation from depression to food insecurity,  $p=0.003$  for causation from food insecurity to depression) (Huddleston-Casas et al. 2008). Kaiser and colleagues (2007) examined factors associated with food insecurity among women within a state of the US and found that women who were food insecure, tended to report more days (per month) of feeling sad or depressed (mean 8.1 days, SD 9.1) compared with the food secure ( $3.5 \pm 5.8$ ). Hamelin and colleagues (2002) also noted experiences of anxiety by some participants in ensuring enough food for the children and the accompanying feelings of despair.

Kaiser et al. (2007) measured the number of days (per month) participants reported poor mental or physical health that interfered with activities. The food insecure group (mean 4.9, SD  $\pm 8.2$ ) had significantly more such days than the food secure

group (1.9,  $\pm 52$ ). A New Zealand study examined the association between food insecurity and K10 scale using national data (Carter et al. 2011). The authors found that the food insecure group had significantly higher levels of psychological distress compared with the food secure group ( $p < 0.0001$ ) and that psychological distress levels were higher in females (OR 2.1 vs 1.6 for men;  $p = 0.03$ ) (Carter et al. 2011).

Therefore, based on the literature my study explored associations between food security status and psychological distress measures through use of the K10 within the Indigenous Australian and child care centre populations. The findings are reported in Chapters 4 and 7 of this thesis.

## **1.9. Relationship between household food security and child health outcomes**

### ***1.9.1 International data***

A relationship between household food security with child health and development has been shown (Cook 2008; Feinberg 2008; Gundersen 2008). Studies conducted in both developed (Cook 2008; Feinberg 2008) and less developed countries (Ordinioha 2008) have shown that increasing severity of household food insecurity increases the odds of child food insecurity and reported poor health, hospitalisations, and developmental issues (Cook 2008) and malnutrition (Ordinioha 2008). Other factors influencing household food security in these studies include the presence of maternal stressors (Gundersen 2008), adult smokers in the house and extraneous environmental factors such as seasonality (Cutler-Triggs 2008, Hillbruner 2008).

Also, there are reported links between food insecurity with the child's academic ability and long term health issues e.g. obesity, diabetes and heart disease (Rosier 2011). Egeland and colleagues (2009) conducted a cross-sectional survey of 388 randomly selected pre-schoolers, Inuit children aged 3 to 5 years, in 16 Nunavut communities, Canada. Face to face interviews were conducted with the parents and carers to collect information about food security status and demographic information. Food Security information was collected through use of the US 18-item module modified for use in Inuit populations. Weights and heights were obtained to calculate Body Mass Index (BMI) and measures standardised for age and sex. Findings identified 30.4% of households as food secure and 69.6% as food insecure with child food security identified as 43.9% and food insecurity as 56.1%. Of all the children, 39.3% were identified as overweight and 28.0% as obese (Egeland et al. 2009). Unfortunately, the relationship between child overweight and obesity and food security status were not reported on in this study.

Skalicky et al. (2006) conducted a cross-sectional study among participants of the US 'Children's Sentinel Nutrition Assessment Program (C-SNAP). The sample comprised of 626 caregivers with children aged 6 months to 3 years utilising emergency department services of the Boston Medical Centre (Massachusetts, US). Child food security status was obtained from caregivers using the 8 child food security items of the US 18-item Module. Other information obtained included family demographics, number of child hospitalisations, whether child breastfed, and child's weight and anaemia status. Findings indicated that among caregivers, 89.6% reported children were food secure, 10.4% food insecure, 7.8% reported reduced diet quality for child, and 2.6% reported child hunger. Carers who were more likely to

report food insecurity were immigrants, had less than a college education, were unemployed, and were receiving welfare benefits. Food insecure children were more likely to have had one or more hospitalisations, lived in households with five or more members, and to have been ever breastfed, but not more likely to be at risk for energy protein undernutrition or overweight by composite anthropometric criteria. Of the food insecure children, 61% were iron sufficient with no anaemia; 21% had anaemia without meeting the criteria for iron deficiency; 7% were iron deficient with no anaemia; and 11% had iron deficiency anaemia. The percent of children classified with anaemia, did not differ significantly between food secure and food insecure children. However, when compared with food secure children, food insecure children were more likely to have iron deficiency anaemia. In a regression analysis, food insecure children had 2.4 greater odds (AOR 2.4, 95%CI 1.1-5) of having iron deficiency anaemia when compared with food secure children (Skalicky et al. 2006).

Brotanek and colleagues (2007) analysed the National Health and Nutrition Examination Survey (NHANES) IV (1999 to 2002) data. The final sample consisted of 1,641 children aged one to three years. The study's focus was to identify risk factors for iron deficiency anaemia in US children and to determine the risk factors for iron deficiency among Hispanic toddlers, the largest minority group of US children. Child's ethnicity was defined by parental self-identification and included non-Hispanic white, non-Hispanic black and Hispanic. Of the total sample, 42% of children were Hispanic, 28% non-Hispanic whites and 25% non-Hispanic blacks. Of the children who had all data for iron status (n=960) 8% of these children were considered iron deficient. Other findings were that children whose parents were



interviewed in a language other than English, 14% were iron deficient when compared with 7% of children whose parents were interviewed in English ( $p=0.01$ ); The prevalence of iron deficiency anaemia tended to be higher among Hispanics (12%), when compared to non-Hispanic whites (6%) and non-Hispanic blacks (6%); Iron deficiency prevalence was 20% among overweight children compared with 8% for those at risk for overweight and 7% for normal weight toddlers ( $p=0.02$ ); 12% of toddlers in food insecure households had iron deficiency anaemia compared with 7% in food secure households ( $p=0.06$ ); Toddlers in day care had a lower prevalence of iron deficiency anaemia (5%) compared with toddlers not in child care (10%); and Hispanic toddlers (16%) were significantly more likely than non-Hispanic white (5%) and non-Hispanic black (4%) toddlers to be overweight ( $p=0.0004$ ). Hispanic children were more likely not to be in day care or preschool (70%) compared with non-Hispanic white (50%) and non-Hispanic black (44%) children ( $p<0.0001$ ). A multivariate analysis showed that toddlers not in day care (OR 1.9, 95%CI 1.0-3.3) and those who were overweight (OR 3.4, 95%CI 1.1-10.1) had higher odds of iron deficiency.

Cook et al. (2006) investigated whether child household food insecurity increases the risks of poorer health and whether the national food assistance program for low income families, the US Food Stamp Program (US FSP), modified these effects. A sample of adult caregivers accompanying 17,130 children aged  $\leq 36$  months visiting health clinics and hospitals were interviewed about household characteristics, food security, federal assistance, US FSP participation, changes in benefits, and the child's health status and hospitalisation history. Findings showed that at the household level, 10% of households were classified as food insecure; at the child level, 22% of

the children were food insecure; and 12% of households with children were identified as food insecure. There were no statistically significant associations between household food insecurity or household and child food insecurity and admission to the hospital on the day of an emergency department visit or at risk for growth problems. The US FSP participation significantly reduced, but did not eliminate, positive associations of both household food insecurity and household and child food insecurity with caregivers' reports of children's health as fair/poor. Participation in the US FSP reduced the odds of fair/poor health by 24% in households that were food insecure and by 42% in households that were food insecure with child food insecurity.

Another US-based study by Casey et al. (2001) analysed data of children and households collected through the Continuing Survey of Food Intakes by individuals from 1994 to 1996. This cross-sectional survey of nationally representative sample of 3790 households and 5669 children aged 0 to 17 years of age. The aim was to compare food and nutrient intakes, physical inactivity and overweight and underweight status of children in food insufficient and food sufficient households. Two 24-hour dietary recalls were conducted in an in person interview by a researcher with all participants on a sub-sample. Demographic, household, participation in food assistance programs as well as food expenditure, food insufficiency status and other food related practices were collected. Food insufficiency status was based on identifying with one of two statements describing the food consumed in the household in the past 3 months: "often don't have enough to eat" or "sometimes don't have enough to eat". Questions about weight, height, amounts of exercise and television watching and health status were asked post the first 24-hour dietary recall.

Children younger than 6, had dietary and other information as described above, collected from the primary carer. Findings indicated that 3.0% of households with children reported food insufficiency and 7.5% of low income families with children reported food insufficiency. Food insufficient households with children reported an average of 5.5 days for not having enough to eat. A high proportion (92.8%) reported the reason for not having enough food as a lack of money or other food assistance entitlements. Among households with children with a low income, food insufficient households were significantly ( $p \leq 0.05$ ) larger, had more children in the family, lower income, and a less educated head of household compared to those with food sufficiency. Based on self-reported heights and weights of children, the percentage of overweight children was statistically similar among low-income households, whether food sufficient or insufficient. However, when compared with the higher-income group, the low-income groups included more overweight children. However, there was no significant difference in haemoglobin levels between the food secure and food insecure households (Casey et al. 2001). This is in contrast to the other studies mentioned previously that have reported anaemia rates to be higher in food insecure children (Skalicky et al. 2006; Brotanek et al. 2007).

There are few published studies within the general Australian population that have investigated anaemia in young Australian children (Black et al., 2013; Mackerras et al. 2004; Oti-Boateng et al. 1997) and no studies, to my knowledge, have examined the association of anaemia and food security status. Thus, I examined this relationship, presented in Chapters 6 and 7.

### ***1.9.2 Local data in Australia; Indigenous and non-Indigenous children***

There is no published Australian data on the linkages or otherwise between child health outcomes and household food security. While there is data linking poor nutrition to poorer health outcomes in Indigenous Australians, there is no specific data relating to household food security and health outcomes in either Indigenous or non-Indigenous children.

### **1.10 Why focus on the health of children**

As noted in previously (sections 1.1 and 1.9), food insecurity and undernutrition is known to have causal effects on cognitive and physical development, growth and functionality in children. Also noted, is the link between food insecurity and overweight and obesity in children. If not addressed, overweight and obesity issues remain with children into adolescence and therefore, predisposing these children to poorer health outcomes, such as the lifestyle disease Type 2 Diabetes, that are experienced sooner rather than later in life. Overweight and obesity is fast becoming a serious health concern in Australia and is ranked 5<sup>th</sup> of the 34 member countries of the Organisation for Economic Cooperation and Development (OECD) (AIHW 2012).

It is well known that Indigenous Australians experience poorer health than their Non-Indigenous Australian counterparts and that this impacts significantly on quality of life and overall life expectancy. The Australian Government has recognised that closing the gap in life expectancy between Indigenous and non-Indigenous Australians must begin with a focus on the health of children. Advances in

Indigenous Australian child health will follow improvements in the social determinants of health (education, reductions in poverty, supported parenting and nutrition) (CSDH 2008). The ongoing disparities in mortality and morbidity in Indigenous Australian children, especially those living in rural and remote regions, are largely due to infectious diseases including respiratory, ear, skin, and gastrointestinal infections and rheumatic heart disease (Li et al. 2007).

Anaemia and/or growth failure are amongst the most common afflictions (26%) affecting Indigenous children especially the very young when nutrition is most crucial for later cognitive development, (Walker 2007) optimisation of growth and prevention of disease. The WHO document on ‘Closing the gap in a generation: health equity through action on the social determinants of health’ emphasised the importance of nutrition and early child development (among other factors) (CSDH 2008).

Numerous studies have documented the strong association between growth and iron deficiency anaemia with child development, physical performance, cellular immunity and later adult outcomes (Lynch 2007; McDonald 2008). Thus in this thesis, health outcomes of growth with relevance to height or length, weight and haemoglobin status in relation to food security will be examined (Chapters 6 and 7).

### **1.10.1. Defining the study populations**

Data collection for my studies was undertaken in early 2009 and mid 2011 therefore, presented in this section is population data based on the 2010 Australian Bureau of Statistics (ABS) Australian population census and the 2011 Census counts<sup>6</sup>. Based on the 2011 Census counts, the resident Australian population was 21,507,719 individuals and Aboriginal and Torres Strait Islander people accounted for 2.5% of the population (n=548 370). Further breakdown of the population data by States and Territories, indicated New South Wales had the largest population (n=6,917,658) with the Northern Territory having the smallest (n=211,944). When examining geographical distribution, 32% of Indigenous Australians lived in major cities, 21% in inner regional areas, 22% in outer regional, 9% in remote or very remote (15%) (AIHW 2011).

A closer look at the population indicates the national Indigenous Australian population is also younger with a median age of 21 years compared with the non-Indigenous Australian population median age of 37 years (AIHW 2011). The age group composition of the Aboriginal, Torres Strait Islander and non-Indigenous population differed by age group. As reported by the AIHW (2011), nationally, the Aboriginal population was younger than the Torres Strait Islander and non-Indigenous populations. Within the age groups 0-14 years, 15-49 years and 50 years and over, Aboriginal people accounted for 37%, 51% and 11% respectively; Torres Strait Islanders accounted for 33%, 50% and 16% respectively; and non-Indigenous Australians accounted for 19%, 50% and 31% (AIHW 2011).

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<sup>6</sup> <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2075.0main+features32011>

### ***1.10.2. Northern Territory, Darwin and Palmerston***

When examining geographical Northern Territory distribution, difficulty was experienced with obtaining current information for Darwin and Palmerston separately. Therefore, 2006 ABS census data was used. The Northern Territory's estimated total population in June 2006 was 210,627, with 146 622 individuals identifying as non-Indigenous Australian and 64,005 identifying as Indigenous Australian (ABS 2007). Of the total Northern Territory population, 46.6% were located in Darwin and Palmerston (ABS 2007).

Within Darwin, the Northern Territory capital, Indigenous Australians account for 9.4% of the Darwin population with 2,908 males and 3,324 females (ABS 2007) and non-Indigenous Australians comprise 81.6% of the Darwin population. The Indigenous Australian population was predominantly distributed amongst the younger age groups; 0 – 14 (34.5%), 15 – 29 (25.7%) and 30 – 44 (20.6%) compared with the non-Indigenous Australian population, where population distribution is focussed in the older age group categories 15 – 29 (23%), 30 – 44 (25.3%) and 45 – 59 (22.7%).

Population census data (ABS 2007) for Palmerston was a total of 816 Indigenous Australians (384 males and 432 females) comprising 7.5% of the total Palmerston population (ABS 2007). The Palmerston Indigenous Australian population is reflective of their Darwin counterpart where the highest proportion of the population is in the younger age groups (ABS 2007).

Table 2 presents ABS information for children aged 0-4 years within the Northern Territory. Children aged 0 – 4 years, comprised 7.5% of this population and Palmerston has the largest proportion of children (18.9%). Indigenous Australians account for 13% of children within this age group whereas, their non-Indigenous counterparts comprise 21.3% of Palmerston children aged 0 – 4 years.



**Table 1.1**

**Comparative data of Northern Territory, Darwin and Palmerston children aged 0 – 4 years by Indigenous Australian Status**  
**(Derived from ABS published data in 2008)**

<b>Population group description</b>	<b>Total children aged 0 – 4 yrs</b>	<b>Total sub-population (%)</b>	<b>Total population (%)</b>
<b>All NT</b>	14,569	NA	192,900 (7.5%)
<b>NT Non-Indigenous</b>	8,560	122,729 (7.0%)	192,900 (4.4%)
<b>NT Indigenous</b>	6,009	66,600 (9.0%)	192,900 (3.1%)
<b>All Darwin</b>	4,032	NA	66,291 (6.1%)
<b>Darwin Non-Indigenous</b>	3,378	54,113 (6.2%)	66,291 (5.1%)
<b>Darwin Indigenous</b>	654	6,232 (10.5%)	66,291 (1.0%)
<b>All Palmerston</b>	2,054	NA	10,893 (18.9%)
<b>Palmerston Non-Indigenous</b>	1,948	9,162 (21.3%)	10,893 (17.9%)
<b>Palmerston Indigenous</b>	106	816 (13.0%)	10,893 (1.0%)
<b>*Australian</b>	1,260,405	NA	19,855,288 (6.3%)

Based on ABS 2007 information \* Based on ABS 2008 information

### **1.11. Study Justification**

The earlier sections showed that there is limited published knowledge of the food security experience within Australia and even more so, among those of families with young children and Indigenous Australians. Therefore, issues that will be explored in this thesis will build on the current knowledge base through investigation of the following key points:

- Current information acknowledges food insecurity as a real experience for individuals and families within Australia. However, within the Indigenous Australian context this requires further exploration.
- There is a need to understand and explore the food security experiences and coping strategies utilised of urban Indigenous Australian families and families with children in child care.
- A better understanding of factors that influence household food security status will assist with informing effective strategies and policies to assist with coping during times of food insecurity and to alleviate food insecurity.
- The effect of food security on health parameters of children aged 6 months – 4 years in families with children in child care centres.

As the literature suggests, little is known of the link between household food insecurity and child health outcomes. Ensuring the availability of, accessibility to and affordability of nutritious foods, as well as the knowledge to make decisions about preparing nutritious foods, is essential for establishing positive health and wellbeing outcomes in both children and adults. A healthy start in life is vital for all Australians and provides the essential basis for future participation within the education system

and active engagement in society through areas such as, meaningful contributions in the workforce and cultural connections.

### **1.12. Thesis design, hypothesis and objectives**

My thesis is divided into eight chapters. These chapters detail the literature review (Chapter 1) and provide an overview of the studies in my thesis (Chapter 2), followed by the research methodologies used for the three different stages of the study (Chapters 3 and 6). The quantitative and qualitative findings of these studies are then presented (Chapters 4, 5 and 7) and the final chapter (Chapter 8) consists of an overall discussion and conclusion. The overall hypothesis of my study was:

*“Household food insecurity is experienced by some Australian families and relates to social determinants and/or psychological distress. Children aged 6 months to 4 years living in food insecure households are more likely to have poor growth”.*

Using a mixed method (qualitative and quantitative) approach, the hypothesis was tested to answer the four main objectives in the region of Darwin and Palmerston:

- 1. Explore urban Indigenous Australian families’ experiences of food security.*
- 2. Determine the performance of the US 18-item household food security module within Indigenous Australian families and families (Indigenous and non-Indigenous) with children attending child care centres.*
- 3. Identify factors that influence food security status within Indigenous Australian families and families (Indigenous and non-Indigenous) with children attending child care centres.*

4. *Compare health parameters of children in food secure and food insecure households of families with children who attend child care centres.*

## **CHAPTER 2**

### **STUDY OVERVIEW**

Presented in this chapter is an introduction and overview of my study followed by a brief description of the chapters.

## **2.1. Study Rationale**

As discussed in Chapter 1, research on food security within the Australian context has been underexplored. Of the few studies, described within the general population is the prevalence of reported food insufficiency within various subgroups (Russell et al. 2014; Markwick et al. 2014; Foodbank Australia 2012; King 2012; Rosier 2011; Ramsey et al. 2011; Temple 2006; Gallegos et al. 2008; Nolan et al. 2006; Burns 2004; Quine & Morrell 2004; Radimer et al. 1997).

Available information of food security research undertaken within Indigenous Australian populations is limited and a tendency to have a community level focus (Brimblecombe et al., 2014; Queensland Government 2006; Northern Territory Government 1997). Two recent studies undertaken within urban Aboriginal populations are that of Adams et al. (2012) and Markwick et al. (2014). Adams et al. (2012) used action research to assist an organisational response to improving services for an already identified food insecure population. Whereas, Markwick et al. (2014) examined in a cross-sectional study social determinants and lifestyle risk factors to explain the higher prevalence of food insecurity within an Aboriginal and Torres Strait Islander population.

Based on the literature, there is minimal data available on the food security experiences of Australian families with small children. Even more so, is the scarcity of data on the food security issues experienced by Indigenous Australians living in urbanised areas.

I am a decedent of the Warrumungu people from the Barkly region, Northern Territory and my professional background is a Public Health Nutritionist. From a professional perspective, my interests have been working with Aboriginal and Torres Strait Islander communities in improving overall nutrition. An element within nutrition education and promotion requiring further knowledge was that of enablers for improving nutrition at the household level. This led to my interest in household food security, particularly the determinants of food security and Aboriginal and Torres Strait Islander peoples' understandings and perspectives of food security. Coming from an Aboriginal background and being raised and living in both remote and urban settings, I am fortunate in experiencing interactions that reflect family relationships and broader social connections. These experiences have enabled me to have a unique position with bringing this knowledge to my research.

As outlined in section 2.1 of this chapter, there are limitations with knowledge in assessing food security status within Aboriginal and Torres Strait Islander populations, as well as understandings and perspectives of food security. Therefore, these limitations in the knowledge base have inspired me to undertake this research to provide some scope in firstly, identifying whether food insecurity exists within the study populations and secondly, provide a basis for people's experiences and perspectives of food insecurity.

## **2.2. Study Description**

The focus of my study is on families with children aged 6 months to 4 years living within Darwin and Palmerston, Northern Territory and was undertaken within two population groups, Indigenous Australian families and families with children in child care.

The study design consisted of three stages. Stages 1 and 2 focused on answering the first two objectives, whereas Stage 3 answered the third and fourth objectives. This is summarised in figure 2.1.

### **2.2.1. Stages 1 and 2: Indigenous Australian population**

It is important to note, the term Indigenous Australians used within this thesis refers to Australia's first peoples, the Aboriginal and Torres Strait Islander peoples. Consenting participants were recruited to both Stages 1 and 2 and the stages were implemented concurrently. Stage 1 involved using a questionnaire comprised of three parts:

- Modified US 18-item Household Food Security Module (mUS 18-item Module)
- Social Determinants survey (SD survey); and
- Kessler 10 Psychological Distress Scale (K10 Scale).

The mUS 18-item Module was used to assess households' food security status. This tool has been widely used within the United States of America for a number of years. To my knowledge, a 16-item Module of which is not dissimilar to the 18-item version was used in research studies to assess the prevalence of food insecurity within separate low socio-demographic Australian populations (Ramsey et al. 2011; Nolan et



al. 2006). Anglicare Australia (King et al. 2012) adapted and used the US 18-item Module in a national food insecurity study among Emergency Relief clients to firstly, assess the severity, experiences, impact and predictors of food insecurity, coping mechanisms, and recommendations in addressing the problem. Therefore, a test-retest of the mUS 18-item Module was undertaken in Stage 1 to determine the tool's repeatability. A social determinants survey was constructed using validated questions from other questionnaires (Chapter 3) to collect demographic, food accessibility and affordability, socio-economic and other information with relevance to household food security. The K10 Scale was used to collect important information about the primary care giver's level of psychological distress within the past 4 weeks.

Stage 2 involved learning about participants' experiences with food security and if problems encountered, what coping strategies were employed to overcome these. Since there was no known information about this topic within the Australian population and very little in other populations, thematic analysis was used to form the methodology and an iterative process was undertaken. It was during the participant questionnaire interviews, the items within the mUS 18-item Module prompted participant initiated discussions. These discussions were often about participants recalling when problems were experienced and what was done to address these problems. I took notes and this formed the initial themes. A subgroup was selected to undertake the in-depth interviews in and an interview guide was developed from the notes taken during the initial discussions (Chapter 3). In-depth interviews were conducted and topics (themes) were discussed by the participant until no new information evolved. All sessions were audio recorded with notes taken.

### **2.2.2. Stage 3: General population**

Stage 3 was the largest component of the study and designed to answer Objectives 3 and 4. Child Care Centres were firstly engaged and consented to being recruitment sites. The revised data collection tools and research processes were piloted in one Centre for clarity prior to roll out, as described in Chapter 6. Similar to Stage 1, Stage 3 involved using a questionnaire comprised of three parts:

- Modified US 18-item Household Food Security Module (US 18-item Module)
- Social Determinants survey (SD survey); and
- Kessler 10 Psychological Distress Scale (K10 Scale).

A test-retest of the US 18-item Module was also undertaken in Stage 3 to determine the repeatability of the tool within this population. Unlike Stage 1, also involved were collection of child health measures, being child weights, heights/ lengths and haemoglobin levels.

### **2.3. Links between the three Stages**

As described in section 2.2.1, Stages 1 and 2 were undertaken concurrently to:

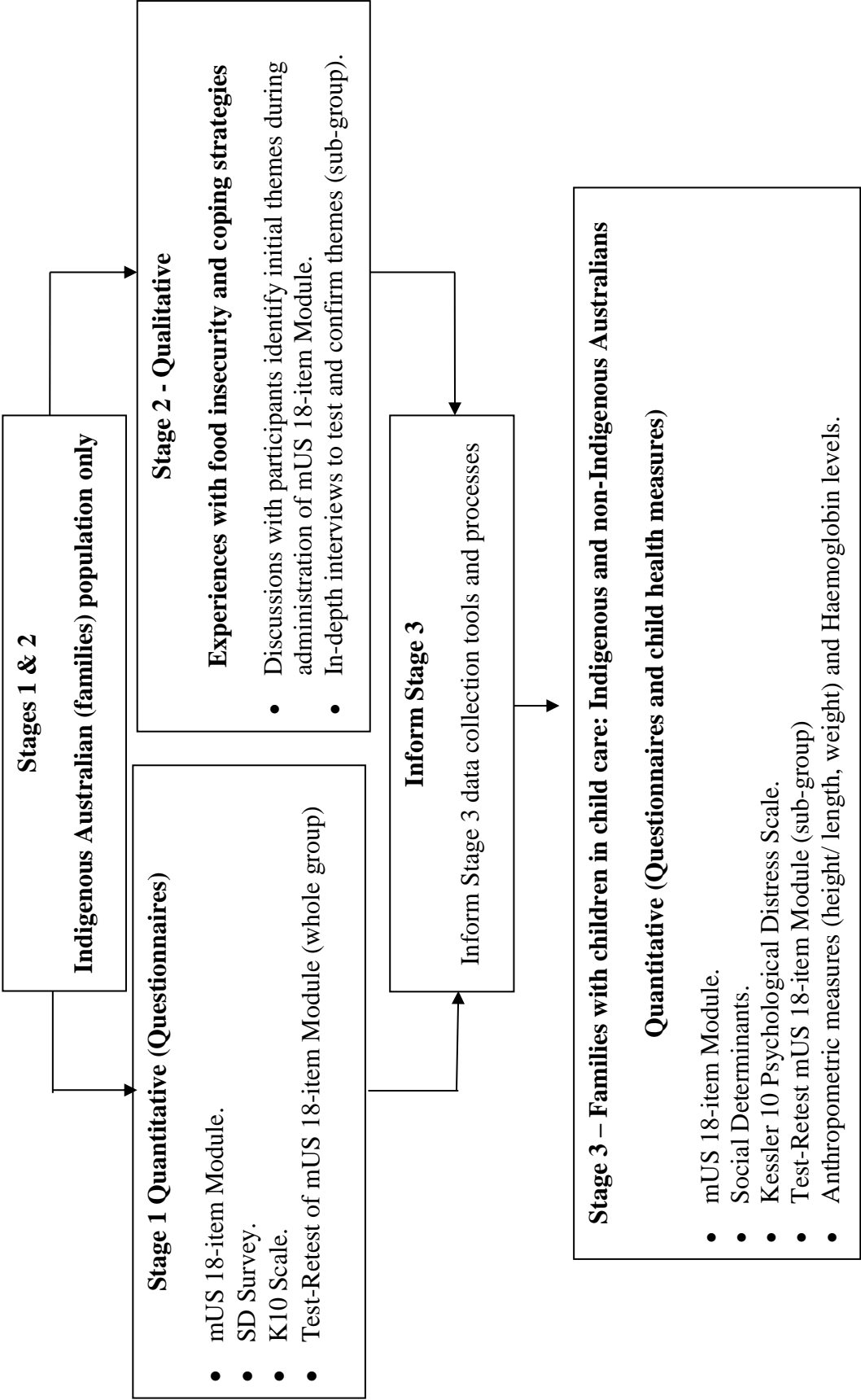
- 1) Maximise data collection by reducing respondent burden time; and
- 2) Obtain initial themes generated from discussions to be further investigated through in-depth interviews.

Stages 1 and 2 findings informed Stage 3 and resulted in the review and refinement of the questionnaire with the inclusion of additional food security questions capturing reasons for experiencing food insecurity and coping strategies used. This was particularly important in firstly, Indigenous Australians would be included in the

Stage 3 sample and secondly, if the reasons for experiencing food insecurity and coping strategies employed were the similar for both study populations. The study information, recruitment and data collection processes of stages 1 and 2 also informed the study design for Stage 3. Outlined in Chapter 3 is the methodology for Stages 1 and 2 and Chapter 6 outlines the methodology for Stage 3.

Figure 2.1

Description of thesis structure with Study processes undertaken



## **2.4. Human Research Ethics approval**

Ethical approval for my study was obtained from the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research and the Aboriginal Sub Ethics Committee. Two separate ethics approval processes were undertaken to account for the different stages. The initial ethics application involved the ethical approval process for Stages 1 and 2 HREC File Reference Number 09/06. The outcomes of Stages 1 and 2 informed the adaption of data collection tools and research processes for Stage 3. Thus, a second ethics approval process was undertaken for Stage 3, HREC File Reference Number 11-1527.

## **2.5. Overview of Thesis Chapters**

Outlined within this section are brief descriptions of each thesis chapter.

Chapter 1 is a literature review and is sectioned to detail the main components of this thesis. Firstly, an overview of food security as a concept; the evolution of defining food security and food insecurity; and food security problems identified in developed nations, such as Australia is detailed. As per the scope of this thesis, literature specifically detailing the experiences of families with young children and coping measures used was sourced. Secondly, the review of literature in measuring household food security, wellbeing, social determinants and determinants of food security are detailed. Also detailed are the choice of tools used in this study and rationale for their use. Thirdly, a review of the literature providing an overview of child health measures with respect to nutrition status is provided and specifically, poor nutrition related health outcomes such as anaemia. Finally, detailed within this

chapter are the determinants of household food security and relationship between food security and health outcomes in children.

Chapter 2, this chapter, is an overview of my study. Described in Chapter 3 is the methodology used for Stages 1 and 2. This information includes data collection tools used; study design and sampling; participant inclusion criteria; recruitment site details; as well as data collection and analysis processes. This is followed by Chapter 4 that describes Stage 1 results and discussion of the study questionnaire and the test-retest process.

The initial discussions with families and in-depth interviews are detailed within Chapter 5 (Stage 2 findings) with an assessment of the study findings against similar published studies. This is with relevance to peer reviewed studies with similar findings, contrasting differences and highlighting what are the unique findings identified in this study.

Using the findings from Chapters 4 and 5, Chapter 6 outlines the methodology used in the whole population quantitative study (Stage 3) and includes a description of data collection tools used to obtain questionnaire data and child health measures; study design and sampling; participant inclusion criteria; recruitment site details; as well as data collection and analysis processes. These results are presented in Chapter 7.

Chapter 8 brings together the findings of the three stages, how they inter-relate and conclusions. From these conclusions arise recommendations for further research and identification of opportunities for research findings to be considered for current and

future service delivery programs at the local, Territory and National levels that provide services for Indigenous Australians and other population groups within Australia. There are also opportunities for this study to inform other future research studies of similar design and interests. What is also of importance are the lessons learned from this research study, particularly with assisting in developing further research in this topic for the development of robust study designs and methodologies for future similar studies.





## CHAPTER 3

### STAGES 1 AND 2 METHODS

This chapter describes the methods for two of my study objectives:

- 1. To explore and define an urban Indigenous Australian community's experience of food security.*
- 2. To determine the performance of the US 18-item Module (mUS 18-item Module) in an urban Indigenous Australian population.*

My specific research questions were:

- 1. Does food security status relate with the demographic and social determinant characteristics of Indigenous Australians living in Darwin and Palmerston?*
- 2. How reliable is the modified mUS 18-item Module in measuring household food security status in Darwin and Palmerston families?*
- 3. What are the factors perceived to influence household food security and what coping strategies are families putting in place?*

### 3.1 Study Design

The overall design for this part of the study consisted of a pretesting phase followed by Stages 1 and 2 (undertaken concurrently) using a mixed methods approach. Figure 3.1 depicts the overall approach and the text provides a more in-depth explanation of the process.

#### 3.1.1. Pre-testing Phase

##### *Pre-study test of the US 18-item Module*

Prior to use of the US 18-item Module, it was first pretested with staff from two Indigenous Australian Health Services, Danila Dilba Biluru Butji Binnilutlum Health Service Aboriginal Corporation (Danila Dilba Health Service) and Bagot Community Health Clinic (Bagot Health Clinic). Semi structured focus groups and individual interviews were undertaken to:

- 1) Clarify terminology used within the questions and if need be, substitute terms with others that had the same meaning.
- 1) Clarify the understanding of questions in the Indigenous Australian context.

A total of 13 Indigenous Australian and 1 non-Indigenous Australian staff members participated. The outcomes were:

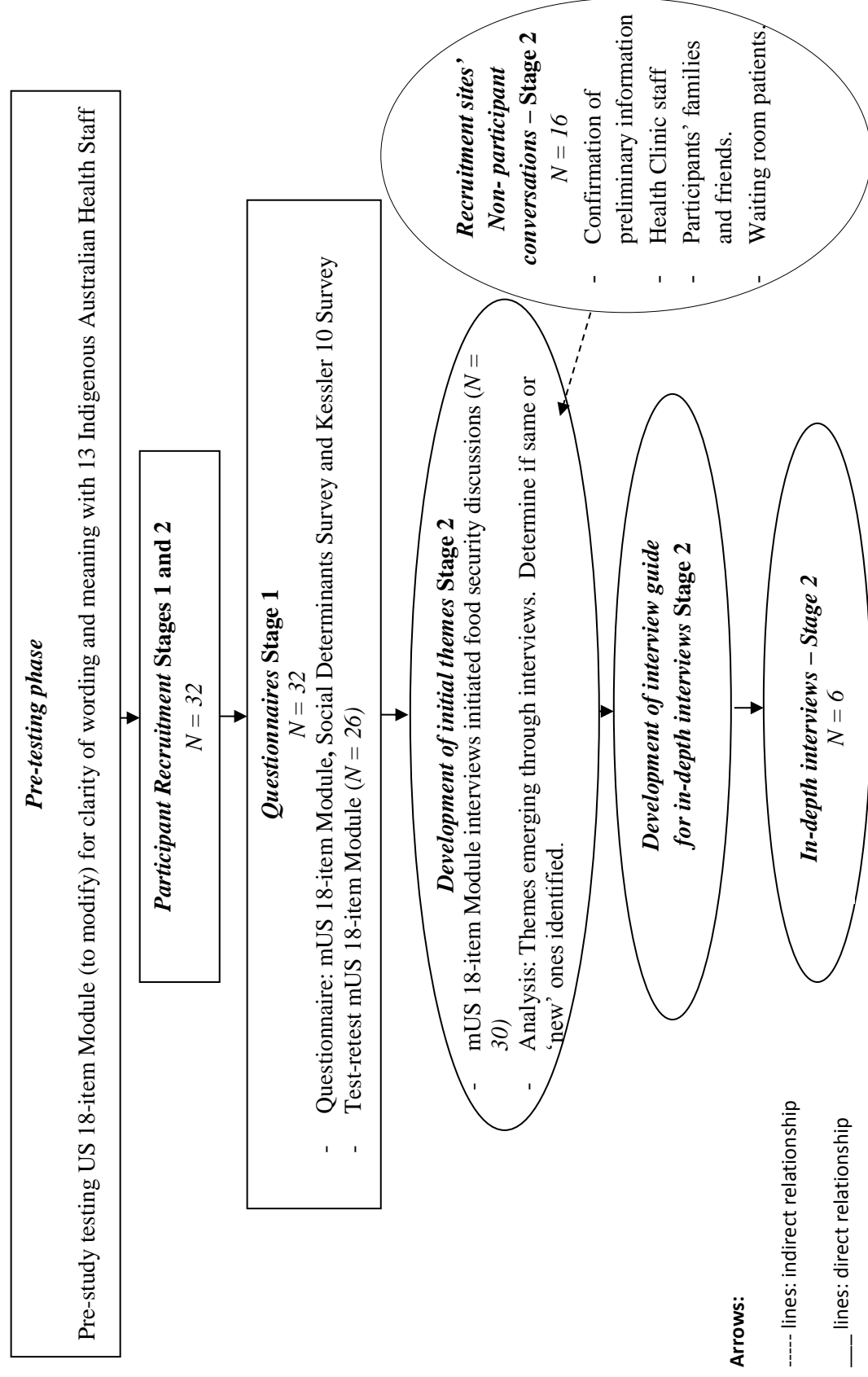
- Adjust questioning for participants not to identify in first person with the statement. For instance, question 1 in the Original US 18-item Module reads: *I/ We worried whether my/ our food would run out before I/ we got money to buy more.*

This was changed to; *Worried about whether food would run out before had enough money to buy more.* And asked as; *“Were you worried food would run out before you had enough money to buy more?”*

- The second important aspect was the term '*balanced meal(s)*'. Consensus for the preferred replacement term is '*healthy foods at each meal*'. When this term was used with study participants, only 2 asked to elaborate whether it also included food variety. The rest understood healthy foods to mean a variety of foods (fruit, vegetables, meats, breads and cereals, milk and other dairy).
- The final adjustment was after each statement, 'Yes' and 'No' response options were included for participant selection. In the original US 18-item Module, three response options are offered for questions 1, 2, 3, 11, 12 and 13: *often, sometimes and never true*. According to scoring in the 'Guide to Measuring Household Food Security' (Bickel et al., 2000), a score of '1' is allocated to 'often' and 'sometimes' responses and score of '0' to the 'never true' response. During the pre-test, respondents preferred 'yes' or 'no' response options instead and the tool was adjusted to reflect this. This adjustment did not in any way affect the interpretation of the question and scoring, as a positive response 'yes', yielded a score of 1 and a negative response 'no', a score of 0. Therefore, the highest overall score obtained is 18 and lowest is zero.

**Figure 3.1**

**Description of study flow for Stages 1 and 2**



### ***3.1.2. Stages 1 and 2***

These stages were designed to answer two of the four study objectives, as mentioned above, and to be undertaken concurrently. The study design allowed for fluidity between the two stages and this approach enabled capturing vital qualitative information from conversations generated during the administration of the questionnaire in Stage 1, which was important in informing the development of the interview guide for Stage 2.

#### ***3.1.2 a. Stage 1: Quantitative Component***

Stage 1 was quantitative and involved assessing households to determine their food security status i.e., ‘food secure’ or ‘food insecure’, with use of mUS 18-item Module. The administration of the mUS-18 item Module also generated discussion about people’s food security experiences and this qualitative information was captured through notes to inform the development of a qualitative interview guide for Stage 2. Social determinants and psychological distress information was also collected in Stage 1 through a questionnaire administered to the primary carer. It was also during this stage a test-retest of the mUS 18-item Module was undertaken to determine its repeatability within the study population.

#### ***3.1.2 b. Stage 2: Qualitative Component***

As mentioned in 3.1.2 a, preliminary discussions about people’s food security experiences were generated during Stage 1 and informed the Stage 2 qualitative interview guide. Stage 2 was the qualitative component and involved interviewing participants about their experiences with food security, determining if any hindering

issues were encountered and whether coping strategies were employed to overcome problems.

### **3.2. Study Sampling**

#### ***3.2.1. Selection of participants Stages 1 and 2***

The selection of participants for both Stages 1 and 2 occurred in Stage 1 and was made very early in the design of the study. This involved working with partner agencies in identifying sites where potential participants were likely to frequent. Once the sites were determined, convenience sampling became the most appropriate manner of recruiting participants.

To identify the most suitable participants, a set of predetermined participant inclusion criteria was developed prior to the study commencement and human ethical approval processes. These criteria were developed with input from the Bagot Health Clinic manager and staff, as well as senior staff from Danila Dilba Health Service during the consultation and negotiation phase. Inclusion criteria were, a parent or carer of a child who:

- Identifies as Indigenous Australian
- Has resided in Darwin or Palmerston for 12 months or more.
- Is aged 6 months to 4 years
- Does not have a medical condition requiring food or nutrition supplements.

#### ***3.2.2. Participant Recruitment Sites***

Permission was sought and granted by the Danila Dilba Health Service to recruit potential participants through the Danila Dilba Health Service Child Health Clinic.

On the advice of the Bagot Health Clinic Staff and Bagot Community Council, an older respected woman who is a resident of Bagot Community was employed as a Research Assistant on a casual basis to assist with recruitment at this site. Prior to recruitment, I provided training to the research assistant about the study and what it involved. Unlike recruitment at the Danila Dilba Child Health Clinics, recruitment at Bagot community was not through the health clinic. Instead, recruitment was undertaken in the broader community and involved the Aboriginal research assistant ‘undertaking a bit of leg work’ in explaining the study to potential participants prior to recruitment visits with the researcher. Approximately a quarter of the total sample was recruited by the Aboriginal research assistant. Unfortunately, this research assistant could not stay long on the project as she was successful in gaining full-time employment elsewhere. Finding a suitable replacement proved a challenge.

Following low recruitment rates, permission from the Northern Territory Government Department of Health was obtained to undertake recruitment through the Community Care Centres Child Health Clinics located in Darwin and Palmerston. With this arrangement, I attended the Community Care Centres’ Child Health and Immunisation Clinics in Darwin and Palmerston and opportunistically recruited participants.

Study promotional material in the form of posters and pamphlets were made available in all settings and I pre-arranged times to be available at sites to provide further information if required. In the waiting room situations, the first one or two visits, I was present and had general conversations with clinic patients. The study was not mentioned at all. It was when a potential participant made a connection

between the researcher and the displayed study information was the study discussed. In these instances, I produced the study information flyer and explained what the study was about, why it was being undertaken, how their identity and information would be de-identified, used and stored if they chose to participate. Questions about the study were also welcomed. If the potential participant indicated an interest, then the consent process was discussed and undertaken. Most participants who got to this stage would sign the consent form to participate in both Stages 1 and 2. There were instances where the display of study posters in clinic waiting rooms and my presence would promote positive interactions between clinic patients and myself. Also intriguing was the fact that the study sometimes became a topic of waiting room conversation and discussed amongst potential participants prior to myself being approached for further information.

Attending waiting rooms proved to sometimes be a lot of effort with little return. Hours in a waiting room and not recruiting anyone may be perceived as a waste of one's time. However, this activity proved to be resourceful as an opportunity to talk with others about the study and life in general. These conversations (sometimes with non-Indigenous people) provided valuable insight into life for families with young children and hardships faced. These hardships seemed no different from those faced by those who became the study participants, and were experienced in a context of limited economic resources to meet living expense demands. The experiences conveyed informed initial qualitative study themes to be further explored with participants.



It was during this stage when participant recruitment was slow that a strategy to overcome this was developed. A decision for the short term was to employ a Menzies Aboriginal Research Assistant known to the broader Indigenous Australian Darwin and Palmerston communities. This proved to be fruitful and about a third of participants were recruited through this person's networks. A further one-quarter were recruited through participants' referrals where participants themselves suggested potential participants.

### **3.3 Stage 1 Data Collection and Analysis**

As briefly outlined above, Stages 1 and 2 data collection was with 32 participating families. Data collection activities for Stage 1 were carried out between April 2009 and February 2010. This was an extended data collection timeframe as 10 weeks of full-time maternity leave was taken during this period and I returned part-time for a further 8 weeks to complete data collection.

#### ***3.3.1. Stage 1 data collection***

This stage comprised two components:

1. Test-Retest of the mUS 18-item Module (See Appendix 3.1);
2. Administration of a three part questionnaire to assess household food security status and obtain important data to provide a broader understanding of Household Food Security:

- mUS 18-item Module: assess household food security status, food secure or food insecure;
- Social Determinants survey (See Appendix 3.2); and
- Kessler 10 Psychological Distress Scale (See Appendix 3.3).

Delivery mode of the questionnaire was in person and I asked the questions and recorded the participants' responses.

##### ***3.3.1a. Test-Retest of the mUS 18 item Module***

The test-retest of the mUS 18-item Module involved face to face administration of the questionnaire in the initial interview process and then returning two weeks later to undertake the interview again. Since this tool had not been used previously in this

population group, and to my knowledge other Indigenous Australian population groups, this process was to test the repeatability of the questions in obtaining similar scores between the surveys. Of the 32 households recruited, 26 completed the test-retest component.

***3.3.1.b. Administering of the mUS 18-item Module, Social Determinants and Kessler 10 questionnaires.***

The mUS 18-item Module is designed to assess household food security status and hunger for households with both adults and children (Bickel et al. 2000) within a response period of the past 12 months. The mUS 18-item Module was administered according to the ‘Guide to Measuring Household Food Security’ (Bickel et al. 2000). The 18 items comprise 15 primary questions and three supplementary questions if a positive response is provided to a previous corresponding question. Questions are categorised according to level of food security experienced. For instance, the first category is marginal food security where questions 1 and 2 are designed to determine food security status at the household level; Questions 3 to 8 assess for food insecurity without hunger and enquires about whether adults and children are not having healthy foods at each meal, and whether adults are reducing the amount of food consumed; Questions 9 to 12 assess for food insecurity with moderate hunger where children are not eating enough food and meal sizes are reduced. Also asked are adults’ experiences of hunger and weight loss due to reduced food intake; Questions 13 to 18 assess for food insecurity with severe hunger and questions target adults and children missing meals and not eating for a whole day. Three questions 6, 14 and 17 enquire about how often adults and children are reducing the size of meals, or going without food. There are three responses, ‘almost every month’, some months, but

not every month and only 1 or 2 months. A score of 1, like other positive responses, is allocated to the question. It is important to clarify for purposes of this research, the mUS 18-item Module was used as a screening tool to assess for household food security status. Additional analysis beyond the scoring of 1 or 0 for questions 6, 14 and 17 to determine response rates to how often the situation occurred by timeframe options, to determine severity of food security problem was not undertaken. A copy of the modified US 18 – item Module (mUS 18-item Module) is in Appendix 3.1.

Other factors that impact on household food security were also collected in the form of the social determinants questionnaire and psychological distress in the form of the Indigenous Australian adapted Kessler 10 (K10) psychological distress scale. The social determinants questionnaire was developed by myself for purposes of obtaining broader information about factors that influence food security status. This included, but was not limited to, information about the primary carer's demographic information, highest educational attainment, income level, employment status, transport situation, access to supermarkets and other food outlets, as well as number of people residing in the dwelling and kitchen functionality (i.e., food storage facilities, such as a kitchen cupboards in good repair with closable doors, functional fridge; ability to prepare and cook food, condition of kitchen bench tops and functional stove). These questions were obtained or adapted from validated surveys administered in Aboriginal and Torres Strait Islander populations nationally and within the study location (Australian Bureau of Statistics 2002 Indigenous social survey Remote Areas; Australian Bureau of Statistics Indigenous Social Survey 2002 Non-remote Areas CAI; Diabetes and Related Conditions in urban Indigenous people

in the Darwin region (DRUID) 2004 questionnaire, pp 7, 8, 31, 32, 71, 80). A copy of the Social Determinants questionnaire used in this study is in Appendix 3.2.

The K10 underwent revisions by the Menzies School of Health Research based Australian Integrated Mental Health Initiative in the Northern Territory (AIMHI NT) for development of an Indigenous Australian friendly version. Dr Tricia Nagel and Ms Carolyn Griffin (nee Thompson) led the consultation (Nagel T and Thompson C. 2007) and testing phases (Nagel T et al. 2009) to adapt the tool. A copy of the Indigenous Australian Kessler 10 Psychological Distress Scale and scoring categories is in Appendix 3 of this chapter.

The Social Determinants and Kessler 10 questionnaires were administered during the same interview following the US 18-item Module and the interview process took approximately 20 minutes. Interviews did not appear to be burdensome on participants. Apart from 7 interviews that were conducted within private settings of the Health Centres and participants work places, the remaining 25 were undertaken within participants' homes.

### ***3.3.2. Stage 1 data analysis***

A Microsoft Access database specifically designed for this study was used for storing data obtained from the mUS 18-item Module, Social Determinants and Kessler 10 questionnaire. Also entered into the database, was information obtained from the administration of the second mUS 18-item Module for the test-retest process as described in section 3.3.1a. Once data was entered, it was checked to ensure all

information had been entered correctly. Being only a small dataset with 32 participants, I completed this process myself.

As described in an earlier section, the mUS 18-item Module has a scoring system where each question responded to as a 'yes' receives a score of 1. If response is 'no', then a 0 is allocated. The individual scores are tallied and an overall score for the module is attained. Households are then classified as food secure (score of 0 – 2); food insecure (score 3 – 7); low food security (score 8 - 12); and very low food security (13-18) (Nord et al. 2009; Bickel et al. 2001). The interest of this study was to assess household food security status (food secure or food insecure). Therefore, the four categories were collapsed into two; food secure (score 0 – 2) and food insecure (score 3 – 18). Stage 1 household food security status findings are presented in Chapter 4.

The K10 has a scoring system according to responses provided to each of the 10 questions (Andrew and Slade 2001). For each question there are five response options: None of the time (score of 1), a little of the time (score of 2), some of the time (score of 3), most of the time (score of 4) and all of the time (score of 5). Therefore, the lowest score a respondent can receive for all ten questions is 10 and the highest score is 50. Like the US 18-item Module, the scores are grouped into four categories indicating level of psychological distress: Low (score 10 - 15), Moderate (score 16 - 21), High (score 22 - 29) and Very high (score 30 – 50).

The categorical rating was used when undertaking bivariate and multivariate analysis of Social Determinants data, K10 outcome score and overall scores of the US 18-item Module. Data analysis of the questionnaire was undertaken using STATA 12.

Initial analysis of the mUS 18-item Module was to determine a household as food insecure or food secure as according to the predetermined assessment criteria described previously. The next aspect was to determine the repeatability of the mUS 18-item module (test-retest) using the Kappa Coefficient of which is the current standard for measuring test-retest (Altman 1991). Repeatability was decided in how similar firstly, the two overall scores were for each administration of the measure and the inter-reliability of the scoring categories (food secure, food insecure). Secondly, the repeatability for each of the 18-items was undertaken to determine same response rate between the test and retest.

Similar to the mUS 18-item Module, the K10 data was analysed according to the sum of scores for each question for a total overall score. The overall score then determined the level of psychological distress experienced within the past four weeks.

The Social Determinants requested information about demographics, socio-economic background and food access. The categorical data was used for bivariate analysis with mUS 18-item Module and K10.

### **3.4. Stage 2 Data Collection and Analysis**

An iterative process for collecting qualitative information was used and involved data collection and analysis being undertaken concurrently. Therefore, described within this section are the qualitative data collection and analysis processes for the initial and in-depth interviews.

Thematic analysis was applied with identification of themes concerning participants' experiences of food security and coping strategies employed. As described by Braun and Clarke (2006:6), thematic analysis is "*A method for identifying, analysing and reporting patterns (themes) within data*". Braun and Clarke (2006) further describe the thematic analysis method as being flexible and not confined to existing theoretical frameworks. Therefore, being a process that does not require the use of pre-determined categories and allows for the creation of categories or codes during data collection as they arise. Data that is similarly coded are combined into themes and themes may be mapped to reveal relationships between them. This process of qualitative data collection and analysis makes it particularly suitable for contributing to this mixed methods study.

#### ***3.4.1.a Initial Discussions***

During the administration of the mUS 18-item Module, participants initiated discussions about experiences with food security, food insecurity and coping strategies. Although these discussions were triggered by some of the mUS 18-item module questions, this extra input was unexpected and participants readily agreed to me taking notes on these discussions. Participants had provided consent to participate in Stages 1 and 2 of the study prior to commencement of data collection.



As stated earlier in section 3.3.1.b, administration of the questionnaire took approximately 20 minutes. However, where discussions were initiated through this questioning process, the duration of a single interview expanded to lasting between 30 minutes to three hours. During discussions, I said very little and only did so to clarify what was said. It was more often than not the participant who decided to end the conversation. Otherwise, I politely ended the discussions if conversation drifted onto other non-related matters. This was also dependent on how important it was for the participant to continue, as sometimes these non-related matters were about the participant wanting to seek counsel or debrief about an issue of importance to them.

Once discussions ended, the notes were read back to the participant to let them know what was recorded and to provide an opportunity to confirm the information. When the interview was completed, I immediately typed the notes into a Microsoft word document and highlighted text referring to food security experiences or coping strategies to form the initial coding for further interviewing. This occurred with each discussion where common codes were identified for use with developing initial themes for further qualitative investigation and analysis. Themes arising inductively through the process of data collection were explored through an iterative process of inquiry and emerging concepts were tested through subsequent interviews. It was also at this time that conversations with health staff, participant's family members and friends, as well as others in Health Clinic waiting rooms (general clinic attendants and nursing staff) assisted with confirmation of initial themes emerging from the data. Therefore, early themes were organised into 'Influencing factors' and 'Coping strategies'. When these themes were explored further using consecutive interviews, the understandings of some were consolidated, while others required

further exploration. It was also at this point, the interview guide for the in-depth interviews was prepared. Outlined in Appendix 3.4 is the inductive development process towards the key guiding questions for in-depth interviews.

#### ***3.4.1.b. In-depth interviews***

Of the 30 participants, ten were invited to participate in the in-depth interviews and criteria were based on a mix of gender and age groups. Of these 10 participants, only six participated. Reasons for four not participating were:

- One participant was withdrawn after three unsuccessful attempts were made to contact the participant by telephone. Messages were left and no returned telephone call or messages were received. Upon the advice of the Research Assistant, a home visit was undertaken by the research assistant and I. The participant was absent.
- Two participants left town to attend family business for a lengthy period of time.
- Due to personal reasons, a participant withdrew from the in-depth interview process.

A number of unsuccessful attempts were made to recruit a further four participants to partake in the in-depth interviews. Due to study time constraints, a decision was made to finalise the in-depth interviews by April 2011. School holidays were approaching and the leg work for Stage 3 was due to commence. However, the six participants who did participate in the in-depth interviews were representative of the main sample in fulfilling gender and age categories: two males, one aged 17 – 38 years and one aged 39 – 48 years; and four females, three aged 17 – 38 years, and one aged 39 – 58 years. The timeframe for each in-depth interview varied from 40

minutes to two hours and was dependent on how much information the participant wanted to share.

As described in section 3.4.1a, themes arising inductively through the process of data collection were explored further through an iterative process of inquiry. Emerging concepts were tested through subsequent interviews and all in-depth interviews were audio recorded with additional notes taken by myself. I transcribed the audio-recorded interviews immediately following the interview and compared with the notes taken. The interview transcription was read back to the participant either in person or over the telephone to verify whether a true account of what was said and to clarify any queries. On three accounts, I went through the transcripts with participants. If clarification of the interview was required by either the participant or myself this was dealt with in undertaking a discussion and further notes taken. Any adjustments were agreed to, verified and included. With one participant, a second in-depth interview was undertaken to further explore experiences raised as there were similarities with identified themes, though differences in interpretation that required further exploration. This interview, transcription and analysis process was undertaken iteratively until data saturation had been reached, meaning no new information or themes were emerging (Tucket 2005; Attride-Stirling 2001).

The initial analysis and coding of all transcriptions was undertaken manually by myself with participant descriptors included with each theme identified. Copies of full transcriptions and codes were provided to Supervisor two (JB) for independent suitability of themes and coding. This process also confirmed the findings and resolved uncertainties arising through the analysis. NVIVO 9 software was used to

manage the data. Presented in Table 3.1 is a summary of the qualitative data collection and analysis process.

**Table 3.1**

**Summary of Qualitative Data Collection and Analysis**

<b>Steps in data collection process</b>	<b>Analysis of information</b>
<b>Step 1</b> Initial discussions with participants. Emergence of initial themes	Analysis of transcripts to identify consistencies in emergence of themes and verification through further conversations.
<b>Step 2</b> Development of interview guide and open ended questions for in-depth interviews.	Audio recordings undertaken and transcription of these. Analysis of each transcript immediately after interview to identify consistencies in themes emerging and identify new ones. Development of codes and independent analysis undertaken by Supervisor 2 to agree on suitability of themes and coding.
<b>Step 3</b> Further in-depth interviews to saturation point	Further analysis indicates saturation point reached.
<b>In all steps</b>	NVIVO 9 software used to manage data and data analysis undertaken manually.

In summary, this chapter presented the methods used for the quantitative (Stage 1) and qualitative (Stage 2) components of my thesis of which the findings are presented in Chapters 4 and 5 respectively. It is also important to note, the findings and data collection process of Stages 1 and 2 informed the questionnaire design for Stage 3 of this study (Chapters 6). In particular, additional questions requesting information about the reasons food insecurity is experienced and the kinds of coping strategies employed are included in the Stage 3 questionnaire.

## CHAPTER 4

### STAGE 1 QUANTITATIVE FINDINGS

Presented within this Chapter are the Stage 1 findings. The research questions addressed in this chapter are:

- 1. Does food security status relate with the demographic and social determinant characteristics of Indigenous Australians living in Darwin and Palmerston?*
- 2. How reliable is the US 18-item household food security module in measuring household food security status in Darwin and Palmerston Indigenous families?*

The method for this component was outlined in Chapter 3 where 32 Indigenous Australian families were recruited to this stage. All 32 participants completed the series of questionnaires comprising of the mUS18-Module, Social Determinants questions and the Kessler 10 (K10) Psychological Distress Scale. Of the thirty-two participants, 26 participated in the test-retest of the mUS 18-item Household Food Security Module.

## **4. Description of Study population**

### **4.1. Household Food Security Status**

#### ***4.1.1 Modified US Household 18-item Household Food Security Module (mUS 18-item Module)***

As described in section 3.1.2a, the mUS 18-item Module is used to assess household food security status. Each of the 18 questions (items) has a binary response (yes or no) where a score of 1 is assigned to each ‘yes’, thus providing a final score with a range between 0 and 18. A higher score reflects more severe food insecurity. As assessing households as being either food secure or food insecure was the interest of this study, the cohort were collapsed into two groups, food secure (scores 0 – 2) or food insecure (scores 3 – 18). Of the 32 participating households, 19 (59%) were considered food secure and 13 (41%), food insecure.

### **4.2. Demographic and Determinants of Food Security**

A social determinants survey was administered to collect socio-demographic information about the study population, including information about the primary carer, income and education levels, and the number of people residing in the house. Presented in Table 4.1 are the demographic and social determinant characteristics of the 32 participants, categorised by household food security status; food secure (FS) or food insecure (FI). Families were recruited to the study based on the child’s or children’s eligibility of identifying as Indigenous Australian; aged between 6 months and 4 years of age; having resided for 12 months or more within the Darwin and Palmerston area; and does not have a medical condition requiring food or nutrition

supplements. The primary carer of the participating child was not necessarily Aboriginal or Torres Strait Islander and therefore, the non-Indigenous Australian category was included in the questionnaire.

An overview of the findings (Table 4.1) showed that the demographics of the food secure and food insecure groups were similar. Most primary carers identified as Indigenous Australian and were female and mothers. More primary carers in the food insecure group tended to have children in the younger age group, were not in paid employment, had a lower income and lower education attainment.

Statistical comparisons were not performed as the groups were too small for the large number of comparisons.

**Table 4.1**

**Demographic characteristics and relationship with household food security status**

<b>Characteristic</b>		<b>Food Secure, N=19 (%)</b>	<b>Food Insecure N=13 (%)</b>	<b>Total group N=32 (%)</b>
<b>Indigenous Australian Status</b>	Indigenous	16 (84%)	12 (92%)	28 (87%)
	Non-Indigenous	3 (16%)	1 (8%)	4 (12.5%)
<b>Gender</b>	Male	3 (16%)	0	3 (9%)
	Female	16 (84%)	13 (100%)	29 (91%)
<b>Primary carer</b>	Mother	14 (73.7%)	12 (92.3%)	26 (81.2%)
	Father	3 (15.8%)	0	3 (9.4%)
	Other (Grandmother and Carer)	2 (10.5%)	1 (7.7%)	3 (9.4%)
<b>Age of primary carer, years</b>	Median (range)	29 (17 - 58)	30 (20 - 44)	
<b>People residing in house</b>	Median (range)	5 (2 - 10)	7 (3 - 15)	
<b>Number of households with number of children (N=53) per age group (months)</b>	6 – 24    0	11 (58%)	2 (17%)	13 (42%)
	1	8 (42%)	8 (67%)	16 (51%)
	2	0	2 (17%)	2 (6.5%)
	25 – 48    0	3 (16%)	4 (31%)	7 (22%)



	1	10 (53%)	5 (38.5%)	15 (47%)
<b>Employment and education status</b>				
	2	6 (32%)	4 (31%)	10 (31%)
<b>Highest qualification (N=31)</b>				
	Working	15 (79%)	7 (54%)	22 (69%)
	Other (not working, home duties and full-time study)	4 (21%)	6 (46%)	10 (31%)
	Primary	1 (5.6%)	0	1 (3%)
	Secondary	3 (17%)	7 (54%)	10 (32%)
	*Post-secondary	14 (78%)	6 (46%)	20 (65%)
<b>^Net Income</b>				
	\$0 – 1,999	15 (79%)	12 (92%)	27 (84%)
	\$2000 and above	4 (21%)	1 (8%)	5 (16%)
<b>Income source 1</b>				
	Wages	14 (74%)	7 (54%)	21 (66%)
	Government benefits or child maintenance	5 (26%)	6 (46%)	11 (34%)
<b>Income source 2 (N=17)</b>				
	Government benefits or child maintenance	8 (100%)	9 (100%)	17 (100%)
<b>Proportion of income spent on food</b>				
	Quarter or less	8 (42%)	5 (38%)	13 (41.6%)
	At least half	10 (53%)	3 (23%)	13 (41.6%)
	More than half	1 (5%)	5 (38%)	6 (18.8%)

^ Data adjusted to reflect fortnightly income. \*Post-secondary qualification: 80% certificate/ Diploma, 10% Undergrad and 10% Postgrad

### 4.3 Food access and Household Infrastructure Characteristics

Information for this section was collected through the social determinants survey. Described within, are the food access and functional kitchen characteristics of the participants categorised in accordance to food security status. The findings are presented in Table 4.2. Findings worth noting are: the food secure and food insecure groups reported similar frequencies of functional kitchen facilities. However, the food insecure tended to shop more at speciality stores and access food outlets within close proximity of dwellings and where the basics food card<sup>7</sup> could be used. With regards to transport, although both groups reported good access to private transport (95-100%), the food insecure group tended to experience transport problems more often and use public transport to access food outlets.

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<sup>7</sup> Income management, the form of the **basics food card** is an Australian Government initiative to assist individuals receiving Centrelink social security payments in managing money to meet essential household needs and expenses, and learn to better manage finances in the long term. (Source: <http://www.humanservices.gov.au/customer/services/centrelink/income-management>)

Table 4.2

Relationship between food access and household infrastructure characteristics with food security status

Characteristic	Food Secure, N=19 (%)		Food Insecure N=13 (%)		Total group N=32 (%)	
Positive responses to functional kitchen	Fridge (N=30)	18 (95%)	12 (92%)	30 (94%)		
	Stove (N=31)	19 (100%)	12 (92%)	31 (97%)		
	Kitchen cupboards (N=28)	17 (89%)	11 (85%)	28 (87.5%)		
	Kitchen benches (N=28)	17 (89%)	11 (85%)	28 (87.5%)		
*Food outlet	Supermarket	19 (100%)	13 (100%)	32 (100%)		
	Corner Store/ service station	12 (63%)	9 (69%)	21 (66%)		
	Specialty Store (butcher, bakery, seafood, fruit and vegetables)	11 (58%)	11 (85%)	22 (69%)		
	Takeaway	11 (58%)	8 (62%)	19 (59%)		

<b>Reason shop at these places</b>	Where want to shop	16 (84%)	6 (46%)	22 (69%)
	Transport problems	2 (10.5%)	3 (23%)	5 (16%)
	Other (close to shops, ability to use basic food card)	1 (5.3%)	4 (31%)	5 (16%)
<b>*Transport type</b>	Public (bus and taxi)	4 (21%)	6 (46%)	10 (31%)
	Private (car)	18 (95%)	13 (100%)	31 (97%)
	Other (motor bike and bicycle)	7 (37%)	6 (46%)	13 (41%)
<b>Transport problems experienced</b>	Sometimes	4 (21%)	5 (38%)	9 (28%)
	Never	14 (74%)	5 (38%)	20 (63%)
	Often	1 (5%)	3 (23%)	4 (13%)

\*Participants selected more than one option applicable to their situation.

#### 4.4 Kessler 10 (K10) Psychological Distress Scale

The K10 Psychological Distress Scale, modified for Indigenous Australian populations, was undertaken to obtain an indication of the psychological distress level of participants. As described in the methods, Chapter 3, participants were asked to rate their responses relevant to the previous 4 weeks. The final K10 score ranged from 10 to 50, and was categorised into low, moderate, high and very high score categories (Table 4.3). Findings showed most participants experienced low levels of psychological distress. Although, the food insecure group tended to report higher levels of psychological distress when compared with that of the food secure group (23.1% v 10.5%). None reported very high levels of psychological distress.

**Table 4.3**

**Kessler 10 (K10) Score and relationship with food security status**

<b>K10 category (score range)</b>	<b>Food Secure, N=19 (%)</b>	<b>Food Insecure N=13 (%)</b>	<b>Total group N=32 (%)</b>
Low (10-15)	12 (63%)	8 (61.5%)	20 (62.5%)
Moderate (16 - 21)	5 (26%)	2 (15%)	7 (22%)
High (22-29)	2 (10.5)	3 (23.1%)	5 (15.6%)
Very high (30-50)	0	0	0

#### 4.5. Test – Retest mUS 18 item Household Food Security Module

To the best of my knowledge (Pubmed search December 2015) the mUS 18-item Module has not been used within this study population. Therefore, the module was tested with 26 participants to determine its repeatability within the study population. This was undertaken using a test-retest of the module with a two-week interval between the first and second tests. Presented within Table 4.4 are the demographics of participants who participated in the test-retest. A majority of participants identified as Indigenous Australian, were females and mothers.

**Table 4.4**

**Demographics of mUS 18-item Module Test-Retest Group**

<b>Demographic Characteristic</b>		<b>Total group N=26 (%)</b>
<b>Indigenous Australian Status</b>	Indigenous	24 (92%)
	Non-Indigenous	2 (8%)
<b>Gender</b>	Male	3 (12%)
	Female	23 (88%)
<b>Primary carer</b>	Mother	20 (77%)
	Father	3 (11.5%)
	Other (Grandmother and Carer)	3 (11.5%)
<b>Age of primary carer, years</b>	Median (range)	28 (20-58)
<b>Number of people residing in house</b>	Median (range)	6 (2 – 15)
<b>Number of children per age group (months) N=44</b>	6 – 24	18 (41%)
	25– 48	26 (59%)

Table 4.5 provides an overview of the test-retest by food security status and there appears to be consistency in participants' total scores between the first and second test. Depicted in Table 4.5, two participants were categorised as food insecure in test 1, and then considered food secure in the test 2.

**Table 4.5**

**Test – Retest of mUS 18-item Module by food security status**

<b>Food Security Status</b>	<b>Test-Retest</b>		<b>Total</b>
	<b>Test 1</b>	<b>Test 2</b>	
<b>Food Secure</b>	16	18	34
<b>Food Insecure</b>	10	8	18
<b>Total</b>	26	26	52

The test-retest results for each question of the mUS 18-item Module are shown in Table 4.6. Worth noting, not all 18 questions required an answer. 15 questions required a mandatory response, whereas three (questions 5, 13 and 16) required a follow up response to questions 6, 14 and 17, to determine how often the event occurred. The different questions had marked variability in Kappa scores that ranged from 0.18 (Question 13) to 0.78 (Question 12). Most Kappa values suggested fair to moderate agreement for the majority of questions. Only 4 questions (7, 10, 11 and 16) had high agreement. Unfortunately, question 18 could not be analysed as Kappa analysis requires data populating a 2 x 2 table arrangement, if cells are missing data, Kappa cannot be performed. The total scores showed that 18 of the 26 participants (69.2%) scored the same between the test and retest, indicating fair agreement.

**Table 4.6****Kappa Coefficient analysis for test-retest of mUS 18-item Module by question**

<b>Question number (brief question description)</b>	<b>Answered same in test-retest N=26 (%)</b>	<b>Kappa (95% CI)</b>
1 (Worried food run out, can't buy more)	18 (69.2)	0.37 (0.00-0.73)
2 (food did not last)	19 (73.1)	0.36 (0 - 0.7)
3 (Can't afford healthy food at each meal)	20 (76.9)	0.36 (0 - 0.7)
4 (relied on low cost food)	20 (76.9)	0.52 (0.14-0.90)
5 (Adults reduce meal size)	21 (80.8)	0.49 (0.11-0.87)
*^6 (N=8) (How often occurred)	4 (50)	Insufficient data
7 (Can't afford to feed children healthy foods each meal)	23 (88.5)	0.61 (0.25-0.96)
8 (Adults eat less)	19 (73.1)	0.32 (0 - 0.65)
9 (Children not eating enough food)	23 (88.5)	0.52 (0.18-0.86)
10 (Adults go hungry)	24 (92.3)	0.75 (0.37-1.1)
11 (Adult loses weight)	24 (92.3)	0.62 (0.24-1.0)
12 (Children's meal size reduced)	25 (96.1)	0.78 (0.41-1.15)
13 (Adults not eat for whole day)	21 (80.8)	0.18 (0 - 0.56)



*^14 (N=5)	1 (20)	Insufficient data
(How often occurred)		
15	22 (84.6)	0.25
(Children go hungry)		(0 - 0.63)
16	25 (96.1)	0.65
(Children miss meals)		(0.29-1.01)
*^17 (N=2)	1 (50)	Insufficient data
(How often occurred)		
18	24 (92.3)	Too few cells
(Children not eat for whole day)		
Total household food security status	18 (69.2)	0.33
score		(0 – 0.70)

\*Answered only if the previous corresponding question was responded to as ‘yes’.

^Kappa could not be performed due to small number of responses.

## 4.6. Discussion

### *Summary and Discussion of Key Findings*

Using the mUS 18-item Module, I found that 59% of participating Indigenous Australian households living in the Darwin and Palmerston regions were food secure and 41% food insecure. Among the sample, food security status was related to: gender of the primary carer; the number of younger children in the household (aged 6-24 months); employment status; highest level of education attainment; income level; choice of where to shop; public transport use; experiences with transport problems; and level of psychological distress. The mUS 18-item Module had a contextual reliability, but was only moderately repeatable within the two-week timeframe.

The estimated prevalence of food insecurity in this study population was higher than the current national data of which reported a prevalence of 31% for remote and 20% for non-remote persons living in a household that had run out of food (ABS 2015). Within this study's population, demographic findings indicate the food secure were similar to those of the food insecure group where most primary carers identified as Indigenous Australian, were female and mothers. This finding is similar to one other known study undertaken within a US minority population, where mothers were identified as the primary carer in both the food secure and food insecure groups (Kaiser et al. 2003).

Of households identified as food insecure (Table 4.1), most primary carers were female. When compared with the food secure households (Table 4.1), the food insecure households tended to have more children in the younger age group, a lower education attainment, lower income and not in paid employment. These findings are similar to other published research where household food insecurity was the focus in at risk groups with young children and indicated that the primary carers are usually mothers who are unemployed or underemployed with a low-income and low education attainment (Stevens 2010; Kaiser et al. 2007; Quandt et al. 2006). Other food security focussed studies, but not specifically in families with young children, have also identified under or unemployment, low income and education attainment as associated with food insecurity (Anater et al. 2011; Ramsey et al. 2011; De Marco et al. 2009; Foley et al. 2009; Nolan et al. 2006; Martin et al. 2003; Hamelin et al. 2002; Radimer et al. 1997). Similar findings from studies with an Indigenous population focus, have been undertaken within Canada and have also identified unemployment, low income and education attainment as associated with food insecurity (Skinner et al. 2013; Ford et al. 2012; Egeland et al. 2010).

As found within this study (Table 4.2), household food storage, preparation and cooking facilities were in good working order and did not appear to be any different between the food secure and food insecure groups. Other relevant studies undertaken with food insecure households have also assessed participants' access to food outlets (grocery shops or food relief services) for purposes of obtaining food ingredients to prepare meals at home (Stevens 2010; Hamelin et al. 2008; Nolan et al. 2006; Kaiser et al. 2003). However, these studies were limited in investigating and providing findings about household food preparation, storage and cooking facilities with

relevance to functionality of household. For example, kitchen functionality as a determinant of food security may not be an identified issue. The research focus of similar studies (Stevens 2010; Hamelin et al. 2008) has been on identifying the food insecure population groups who access assistance programs. In these instances, people who identified as food insecure participated in structured programs with the aim to promote food security through the development of skills, such as cooking, budgeting and nutrition promotion (Stevens 2010; Hamelin et al. 2008). Torzillo et al. (2008) conducted a national study within Aboriginal and Torres Strait Islander communities in Queensland, New South Wales, South Australia, Western Australia and the Northern Territory and assessed houses according to 9 healthy living practices. One of the 9 healthy living practices was improving nutrition through functional nutrition hardware (food storage and preparation space and a functioning stove and sink). An initial assessment found only 6% of households met the criteria for improving nutrition through functional nutrition hardware. Bailie and Runcie (2001) evaluated the design and conduct of the Northern Territory Environmental Health and Housing Program using the nine key healthy living practices. With respect to the improving nutrition item, findings were the infrastructure most frequently identified as not functional or not present were the kitchen bench (26%), stove top (41%) and the oven (42%). Forty two percent of households were identified as having a functioning refrigerator. Bailie and Runcie's (2001) and Torzillo et al.'s (2008) studies have not linked household food infrastructure as a contributing factor to food security status. Though, both studies have identified household infrastructure as necessary and important for improving nutrition.

With respect to food access, all participants reported good access to a supermarket to shop for groceries and to private transport (a car). However, the difference between the two groups was seen as the food insecure group tended to shop more at speciality stores and access food outlets within close proximity of dwellings. Australian-based studies have reported that participants, though not necessarily families with young children, irrespective of socioeconomic status, accessed supermarkets (Law et al. 2011; Coveney and O'Dwyer 2009; Turrell et al. 1996) and with the use of a car (Law et al. 2011). In contrast, Nolan et al.'s (2006) study which was undertaken in three socially disadvantaged localities within a metropolitan Australian city, examined the prevalence of food insecurity and possible strategies to overcome barriers in readiness for a health promotion intervention. A reported strategy was to improve transportation to food outlets. Other studies undertaken within the US with a focus on food insecure families, have also identified that issues with access to larger grocery stores (supermarkets) that stock a better range and priced foods has been due to limited access to a private car. Families therefore, tended to access food outlets within close proximity to residences and that were more expensive (Stevens 2010; De Marco et al. 2009; Clifton 2004).

Psychological distress, as assessed with use of the Kessler 10 that was adapted and tested for Aboriginal people (Nagel et al. 2009), collected responses within the past four weeks from date of the survey for the study group. Although most participants experienced low levels of psychological distress, the food insecure group indicated experiencing high levels of psychological distress compared with food secure participants. The prevalence of high psychological distress (overall 15.6%) found in my study is lower than that described in the 2012-13 Australian Aboriginal and

Torres Strait Islander Health Survey (AIHW 2015), that described 30% of respondents aged  $\geq 18$  years reported high to very high levels of psychological distress. Of this proportion in the ABS data, 36% were women and 24% men. Further findings from the 2012-13 Australian Aboriginal and Torres Strait Islander Health Survey (AIHW 2015) compared non-remote to remote and indicated that those residing in non-remote locations experienced higher levels of psychological distress (32%) than those in remote areas (24%).

Findings from other relevant studies have identified associations between food insecurity and wellbeing, particularly in primary care givers. However, these samples are mixed where families consist of younger as well as older children and have included families without children. For instance, a study undertaken in a broader low-income adult population within the US, found food insecure adults when compared with the food secure, scored lower for a 12-item health survey ( $P < 0.0001$ ) indicating poorer physical or mental health status (Stuff et al. 2004). With respect to a relationship between food insecurity and maternal depression, a US based study described the relationship between food insecurity and maternal depression was bidirectional ( $p = 0.034$  for causation from depression to food insecurity,  $p = 0.003$  for causation from food insecurity to depression) (Huddleston-Casas et al. 2008). Kaiser and colleagues (2007) examined factors associated with food insecurity among women within a state of the US. Specific findings indicated women who were food insecure, tended to report more days in a month of feeling sad or depressed (8.1 days, mean SD  $\pm 9.1$ ) compared with the food secure (3.5 days, mean SD  $\pm 5.8$ ). Kaiser et al. (2007) also measured the number of days within a month that poor mental or physical health interfered with activities. A higher number of days were reported in

the food insecure (4.9 mean  $SD \pm 8.2$ ) than food secure (1.9 mean  $SD \pm 5.2$ ) (Kaiser et al. 2007). Relationships between higher levels of psychological distress, as measured by K10 scale, and food insecurity has been examined by Carter et al. (2011) in New Zealand. Found was the food insecure had higher levels of psychological distress when compared with the food secure group ( $p < 0.0001$ ). When categorising by gender for psychological distress associated with food insecurity, females had an OR 2.1 compared with males who had an OR of 1.6 ( $p = 0.03$ ) (Carter et al. 2011). Within my study, the study population was too small to perform a regression analysis or undertake a further level of analysis to differentiate by gender. However, as described in the previous paragraph, the food insecure within this study population appeared to report high levels of psychological distress when compared with the food secure group. Even though the data shows a relationship between food insecurity and moderate to high levels of psychological distress, unlike the study undertaken by Huddleston-Cass et al. (2008), it is difficult to surmise whether psychological distress was a pre-existing factor that influenced food insecurity status or whether it presented as an outcome of being food insecure. Thus, causation cannot be implied. Further, determining causal relationships between food security status and levels of psychological distress is not focus of this study, thus requiring a different study design to this study and a larger sample size.

A Kappa analysis was undertaken for the test-retest of the mUS 18-item Module to determine repeatability of the tool in this population. The results indicate fair to moderate agreement for a majority of questions. The overall scores within this subgroup showed 18 of the 26 participants (69.2%), scored the same between the test and retest indicating fair agreement. The fair agreement suggests either the tool is

not repeatable, or that the food security status of the population is labile. Other studies have adapted and validated the US 18-item module in other populations (Derrickson et al. 2000; Gulliford et al. 2006; Rafiei et al. 2009; Bezuneh et al. 2008). However, these studies did not report on the Kappa coefficient of their adapted tool, and as discussed in the methods (Chapter 3) section 3.3.2, the Kappa Coefficient is the current standard for measuring test-retest (Altman 1991).

The kappa results showed fair agreement between the test-retest of the mUS 18-item module. Therefore, as suggested in a study by Bezuneh et al. (2008), further cognitive testing of the items within the tool to determine understanding of concepts and use of language; as well as testing the tool with a larger Indigenous Australian population sample is recommended.

## **4.7 Strengths, Limitations and Implications**

### ***4.7.1 Strengths***

To my knowledge, this is the first study that has investigated household food security status and its determinants within an urban Indigenous Australian population. A majority of studies with relevance to my research have been undertaken in known food insecure populations within the United States and Canada, where recruitment was through identified food assistance programs. There are few similar studies to mine where participant sampling is from within the general population. Within the limited Australian food security research context, most research targeting food security is population based. However, few specifically targeted Indigenous



Australian populations or families with young children. Therefore, this study has provided new knowledge to the literature and insight to Indigenous Australians food security experiences. More specifically, food security as experienced by urban Indigenous Australian families with young children and broader contributing factors.

When using the mUS 18-item Module, I administered the measure in person and care was taken in firstly explaining the definition of food security prior to questioning. Egeland and colleagues (2010) have also administered the 18 item Module face to face within an Inuit population. My approach may have assisted participants with answering the questions as food security is more than just having food or something to eat. Other studies, including the United States Government National Food Security monitoring unit, collect information through self-administration or via computer assisted technology where a phone call is made to a potential participant (Bezenuh et al. 2008; Guilliford et al. 2006; Bickel et al. 2000). My approach is likely to have assisted participants with answering the questions in the context of their household's food security experiences.

#### ***4.7.2 Limitations***

However, there are differences in my study's findings that may underestimate, or overestimate, the level of food insecurity or food security within the study population. Recruitment was undertaken through health services where families with young children frequent; within a low socio-economic urban Aboriginal community; and through a local Aboriginal research assistant's networks. This may have influenced the sampling of potential participants resulting in a bias. The study was

conducted at a time of Australian government welfare reform for Indigenous Australians residents of the Northern Territory. There was a certain level of suspicion with this research in why the information was being collected and how it was to be used. Respondents may therefore, have been apprehensive to reveal their situation in fear of negative repercussions. However, I found respondents to be open and frank in their responses as well as willing to discuss the reasons surrounding their circumstances. The sample size of 32 households was also small and caution is to be exercised when applying findings, as the views and experiences of this cohort are likely to be particular to this study sample. The findings of found here do not imply causation.

#### ***4.7.3 Implications for policy, practice and further research***

The results indicate household food insecurity is a real experience for Indigenous Australian people within the study population and that it is likely to be related to income level, education attainment, employment status and the number of young children in the household. Policy changes related to increases in the cost of living, including increases in prices of essential amenities and food, need to be given careful consideration in respect to potential negative effects on families at risk of food insecurity. Findings of this study also provide valuable insight for suburban residential planning with respect to location of larger stores and supermarkets to enable access to a broad range of healthy food at competitive prices. There was also an indication that participants had access to private transport for shopping. However, a proportion of participants accessed public transport to shop at supermarkets or accessed smaller and more expensive shops that were in walking distance.

Government assistance for low income earners could extend to considerations of subsidising public transport, in particular taxi services for food shopping. This service has been noted by another Australian research study (Coveney and O'Dwyer 2009) where taxi vouchers are provided to the elderly and disabled who are recipients of a government pension and suggest a similar scheme for families with young children would be beneficial in enabling families to undertake food shopping and have taxi access to transport food home. Most chain supermarkets in major centres now have online shopping and a minimal delivery fee. Reliable internet access and a credit debit card are required to participate in this service, of which not all low income earners may have. A further suggestion, if not already in place, in considering support for low income families is for current government support agencies to consider and promote a service to assist clientele with young children with registering for online shopping.

It is important to note, this study is a snapshot of the study population and further similar research is required. Firstly, a larger sample size in different settings (remote and non-remote in different Australian states) is required to confirm the findings of this study. Secondly, the use of the mUS 18-item Module to measure food security among participants was valuable in creating insight into the level of food insecurity experienced. The test-retest process undertaken with the module also demonstrated only fair repeatability within the small sample. A future study could include more in-depth cognitive testing of questions for clarity of understanding and interpretation similar to that suggested by Bezuneh et al. (2008). A larger study may provide the potential to test the use and validity of the module across a number of Australian settings.

Interactions with participants provided a perception that a majority of respondents lived week to week, and were not in a position to plan or put arrangements in place to deal with difficult times when “money is tight”. This may also feature in the retrospective reporting period of 12 months in the mUS 18-item Module. A future study investigating response timeframes for reporting would provide valuable insight with what are reasonable and acceptable reporting timeframes for participants when responding to retrospective questions. For instance, the standard timeframe for reporting, as per the ‘Guide to Measuring Household Food Security’ (Bickel et al. 2000), is within the previous 12 months. However Bickel and colleagues (2000) also indicated the robustness of the tool within the timeframes of 30 days or 3 months. The potential of varying reporting timeframes may have implications in understanding patterns of when food insecurity are experienced, such as improved recall timeframes if food insecurity is not regularly experienced. An assessment of the US 18-item Module was undertaken by an expert review panel in 2010 (Wunderlich and Norwood (ed) 2010). One of the points raised was the 12 month reference period for reporting, suggesting it may be difficult for respondents to report over this timeframe unless experience is a regular event (Cohen et al. 2002 in Wunderlich and Norwood (ed) 2010). Benefits with a future study to focus on a shorter timeframe would provide valuable insight into determining whether seeking information over the previous 12 months is feasible in this population. As circumstances that influence household food security frequently changes in Indigenous Australian populations of my sampling frame (e.g. family illness, loss of employment), it is highly likely that a 12 month timeframe would yield different results.

Noted in Egeland et al.'s (2010:245) study is the use of the US 18-item module as 'slightly modified by Indian and Northern Affairs Canada'. A future study that could also be considered is that of adapting the tool to 'fit' with the local environment and investigate methodologies where the US 18-item Module has been adapted for Indigenous populations. For instance, outlined in the methods chapter, Chapter 3 Section 3.1.1, a pre-test of the US 18-item Module was undertaken to clarify terminology, ease of question comprehension and simple response options. The outcomes of this exercise resulted in a more user friendly tool that was acceptable within the study population. A future study with Indigenous Australian families with children aged 6 months to 4 years would benefit in validating the tool against dietary intake and child health outcomes, as well as cognitive testing for understanding of questions. Stevens (2010) conducted cognitive testing with young mothers living in the US and found all participants were unsure of the language of the survey, phrasing of the questions were confusing and they did not understand what they were being asked. A particular response for a few US 18-item Module questions is *often true* or *sometimes true* of which the women had difficulty in defining what this meant to provide an appropriate response. I focus tested the questions with staff at two Aboriginal health services and the outcome was to have simple responses (yes and no) to questions, as a number of response options was confusing (chapter 3 methods). Having a reliable tool to assess food security within Indigenous Australian populations would value add to current services in addressing disadvantage within urban, rural and remote Indigenous Australian populations. For instance, the availability of a reliable food security assessment tool in regular monitoring of the population would inform policy in better resourcing or orientation of programs and services to address need.

Overall, results presented in this chapter can be used as a reference point for further studies, including a tested methodology and initial insights into the food security experiences of Indigenous Australians within the study population with potential for further exploration. In particular, there is potential to build on the findings of this study to further explore a measure that incorporates items to assess food insecurity status and coping strategies used. This may accurately capture Indigenous Australians' food security experiences for purposes of program and policy planning, monitoring and evaluation and measure food insecurity prevalence rates.

## **CHAPTER 5**

### **STAGE 2 QUALITATIVE FINDINGS**

Presented within this chapter are the qualitative findings and discussion for Stage 2 of this study. The methods used were described in Chapter 3. The research question addressed is:

*What are the factors perceived to influence household food security and what coping strategies are Indigenous Australian families putting in place?*

## **5.1. Study Demographics**

As detailed in Chapter 3, 32 participants were recruited and completed the closed-question questionnaires. Whilst administering questionnaires, unstructured free ranging discussions were undertaken with thirty of the 32 participants and information about their food security experiences and coping mechanisms were obtained. Six participated in the subsequent in-depth interviews.

Table 5.1, depicts the demographic characteristics of participating households for both the initial discussions and in-depth interviews.



**Table 5.1.****Demographic characteristics of Households**

<b>Characteristic</b>		<b>Initial discussions</b>	<b>In-depth interviews</b>
		<b>(N = 30)</b>	<b>(N = 6)</b>
<b>Parent gender</b>	Female	27	4
<b>Marital Status</b>	Partnered	17	5
<b>Indigenous status</b>	Aboriginal	19	5
	Torres Strait Islander	1	0
	Aboriginal and Torres Strait Islander	6	1
	Non Indigenous Australian	4	0
<b>Carer</b>	Parent (mother/ father)	27	6
	Other (grandmother/ foster carer)	3	0
<b>Parent age (yrs)</b>	Median (range)	44.5 (17-58)	35 (25-39)
<b>Residents in house</b>	Median (range)	6 (3-15)	5.5 (3-10)
<b>Number of children by age group</b>	6 to 24 months	19	3
	25 to 48 months	30	5

As depicted in Table 5.1, 30 participants engaged in initial discussions and the majority were female, Aboriginal, with an age range between 17 and 58 years, and over half of the participants had partners (married or de facto relationship).

For the in-depth interviews, 10 participants were invited to participate and six agreed. Of the six participants, four were female, aged between 28 to 38 years and

three had partners. The remaining two participants were male, one partnered (married or de facto relationship) and the other a widower; both were aged between 36 and 38 years. The reasons provided for the four participants who did not partake in the in-depth interviews were:

- Participant not available after three attempts to contact.
- Two participants had left town to attend family business<sup>8</sup> for a lengthy period of time.
- Due to personal reasons, the fourth participant withdrew from the in-depth interview process.

Attempts to recruit a further four participants within the study timeframe to partake in the in-depth interviews were unsuccessful.

## 5.2. Theme groups

Depicted in Figure 5.1 is a schematic diagram summarising the emergence of initial themes through the unstructured discussions with 30 participants. These themes were consolidated and further enriched through the in-depth interview process. The themes were grouped firstly according to factors influencing food security and coping strategies, then as:

- i) Experiences of Food Insecurity;*
- ii) Influencing Factors;*
- iii) Impact on food selection; and*
- iv Coping Strategies.*

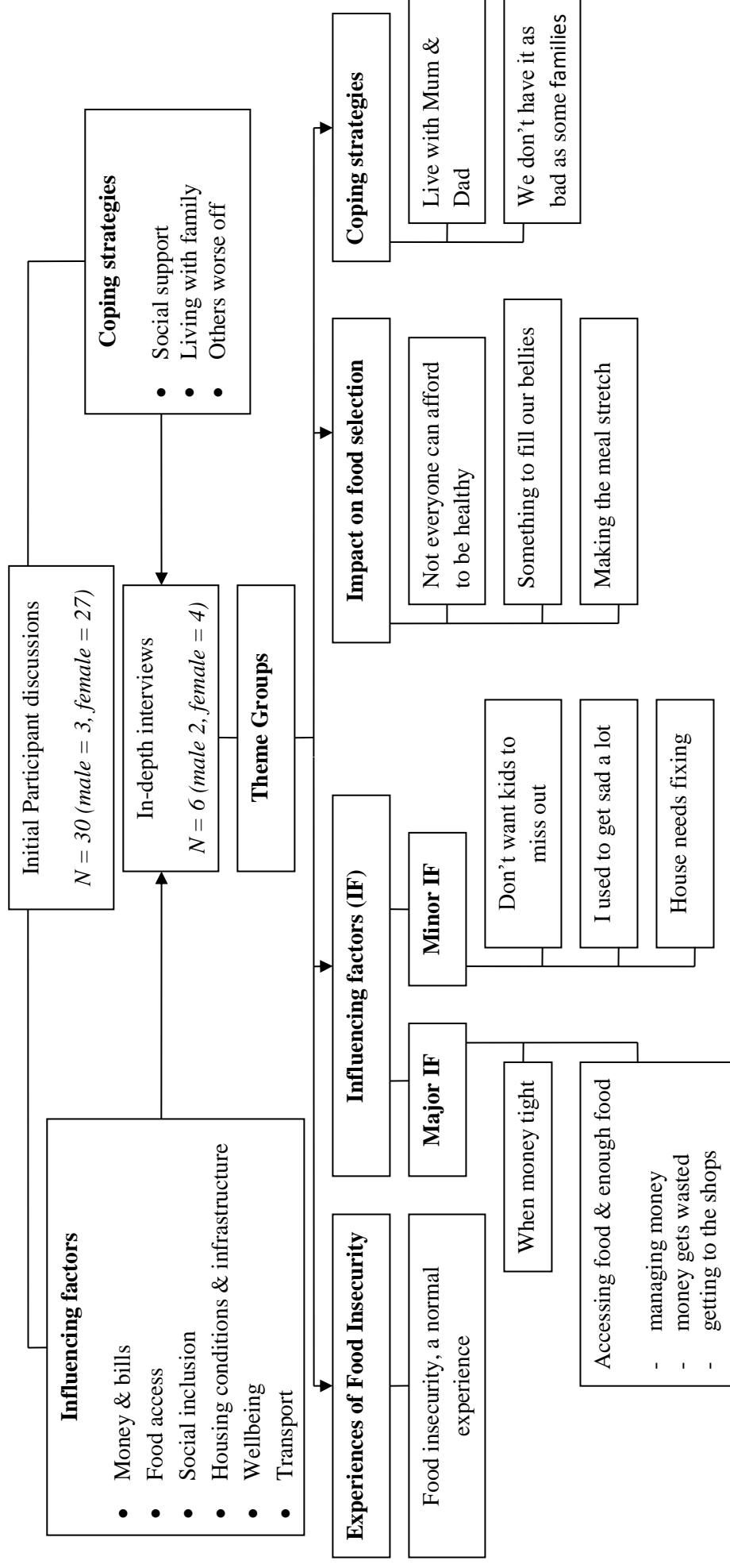
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<sup>8</sup> **Family business** refers to cultural obligations with reference to family relationships, customary rituals and ceremonies. It is also where cultural respect, knowledge and practice are observed and transferred from one generation to the next.

Themes relating to influencing factors are presented as major or minor influencing factors and determined both by the number of participants referring to these themes and the strength of their responses. A detailed description of the qualitative research findings and interpretations is presented below.

Figure 5.1.

# Overview of significant Qualitative Findings



### **5.3. Experiences of Food Insecurity**

#### ***5.3.1. Food insecurity, a normal experience***

During initial discussions participants did not identify with being food insecure, although many participants' experiences indicated otherwise. However, use of the mUS 18-item Module triggered participants to consider their own experiences and situation. This was useful in raising awareness and understanding amongst participants and their families. Participants were open to discussing their own and others' experiences with not having enough food, money or both and in general considered food insecurity to be a common occurrence among themselves and people close to them. The experiences of food insecurity as told by participants implied that food insecurity was seen by most as a 'normal' experience and also considered 'the norm' within their close social interactions. However, revealed further is how these food insecurity experiences impacted adversely on peoples' everyday lives.

As reported in Chapter 4, 13 of the thirty-two participants (41%) were identified as food insecure by the mUS 18-item Module. An Aboriginal woman spoke of her dilemma with not having enough money to buy food for her family.

*“There’s not enough money, full stop, to pay for food, to last from payday to payday”.* (Aboriginal mother with four children, aged 34 years and partnered)

Another participant shared his observations when out shopping.

*“....I’ve seen people put food back. Put things back because they can’t get [afford] that. Or take a milk bottle back to get a smaller bottle of milk. Yes, you do see it around.”* (Aboriginal and Torres Strait Islander father of two children, aged 36 years and partnered).

## **5.4. Influencing Factors**

Influencing factors encompassed sub-themes that directly affected participants' food security experiences. The minor influencing factors were referred to by fewer participants, but were none-the-less major concerns for these respondents.

### **5.4.1. Major Influencing Factors**

These influencing factors were comprised of the sub-themes "*when money is tight*" and "*accessing food and enough food*".

#### **5.4.1a "*When Money is tight*"**

Many participants shared their experiences of having to prioritise everyday spending when money was tight. Incoming bills, such as quarterly electricity bills, were a main reason for making "money tight". Participants referred to redirecting limited money to paying bills with this impacting on food availability and to some degree, food quality. For some, this situation only occurred occasionally when larger bills had to be paid whereas for others, this was an everyday phenomenon. At least eleven participants experienced "money tight" as a chronic problem. Four of these 11 participants mentioned not having enough money at all times due to an inadequate income.

Nearly all participants related the cause of "money being tight" to the cost of living. Nine of the 30 participants spoke in detail about their experience with having to stretch available funds periodically when the larger bills had to be paid. This involved ensuring enough food for the family during these times and making decisions to choose less expensive foods, such as low nutrient quality highly

processed foods or cheaper brand options. For example, with fruit and vegetables some participants referred to purchasing in lesser quantity, not buying at all or substituting for cheaper processed versions, as strategies used when “money tight”. Approximately half of the participants spoke of situations in choosing less expensive foods in the context of ensuring children always had something to eat at each meal. This situation was not limited to participants who were recipients of Centrelink<sup>9</sup>, as participants in paid employment, or who had partners in paid employment, also experienced this phenomenon. For instance, a 25 year old Aboriginal woman partnered with three children, mentioned that even though both she and her husband had paid employment, they still sometimes experienced difficulties.

*“Sometimes we have to be tight [with money] when the big bills (electricity, car repayments) come in and choose less expensive foods to buy”.*

A 38 year old Aboriginal man, sole income earner, partnered with a child, spoke of his experiences when “money tight” and spoke of a few strategies to overcome problems. One strategy to cope with payment of larger bills was to cut back on what he termed ‘luxury items’ such as snack foods, sweet drinks or desserts.

*“Don’t have real problems with food [having enough to eat] or with money. Only time may have to get tight with the budget is when the big bills come in. This just means cutting back on luxury items”.*

Through further discussions, this participant revealed other measures used to overcome money problems. These strategies were to immediately relieve “money

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<sup>9</sup> The **Centrelink Master Program** is one of the Master Programs of the Australian Government Department of Human Services (Australia). The majority of Centrelink's services are the disbursement of social security payments (Source: Wikipedia site [en.wikipedia.org/wiki/Centrelink](http://en.wikipedia.org/wiki/Centrelink).)

tight” situation and ensure adequate food, though had greater cost implications in the longer-term.

*“Often the bill would come in and we would go and do a shop and then make that shop stretch to the next pay to pay the bill. I would consider putting food in people’s guts (stomachs) more important than paying bills. If you don’t pay the bill on time, there’s a late fee - \$30, \$40 dollars. Might as well pay it late, that’s how I would look at it”. “.... power bills are large, come in quarterly which is not too bad, but they’re big bills. ...split it between the members of the household. Split about \$500.00 each, which after mortgages and everything else, that’s a fair chunk. Yeah, so you either do your shopping two weeks in advance because you know it’s coming up and pay the next bill [from the following pay period]. Or you pay [bill] half now and half later” (38 year old Aboriginal man, sole income earner, partnered with one child).*

As previously mentioned, the experience of “money tight” was perceived as a chronic problem by 11 participants. Four mentioned not having enough money at all times and three of the four participants were receiving only Centrelink payments. These payments were considered by participants to be inadequate in meeting their households’ basic living costs. A 34 year old Aboriginal woman in a relationship with four children commented that income management<sup>10</sup> was good for families who needed help with budgeting. However, this woman explained that in her case where she “looked after her children properly” it did not help with having enough money to buy food for the family.

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<sup>10</sup> **Income management** is an Australian Government initiative to assist individuals receiving Centrelink social security payments in managing money to meet essential household needs and expenses, and learn to better manage finances in the long term.  
(Source: <http://www.humanservices.gov.au/customer/services/centrelink/income-management>)



*“I have three boys and you know, they eat a lot. One loaf of bread eaten for breakfast! I don’t think we get enough money and I can’t pay for all the food from my basic card<sup>11</sup>”. (Aboriginal mother of four children, 34 years and partnered).*

Another participant who stated that she had money problems all the time worked full-time. This woman had a regular income, but her partner had been having problems with securing permanent full-time employment.

*“I work full-time, but don’t get paid much. My partner works when he gets work and we also rely on government money [Centrelink payments]. The money that we do get seems to just cover the rent, food and basic necessities. Rent and food are expensive in Darwin. We also have a car to run and that’s also expensive”. (non-Indigenous mother of four children, 30 years and partnered).*

This experience was in contrast to that of an Aboriginal woman who was a full-time student. This woman’s husband was in permanent full-time employment, earned a “good wage” and was able to meet the family’s needs.

*“If my husband wasn’t on a good wage and he didn’t earn enough to cover the bills and other expenses, we would definitely be struggling”. (Aboriginal mother of one child, 27 years and partnered)*

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<sup>11</sup> **Basic card** (similar to a bank key card). A portion of income managed individuals’ payments are deposited into a basic card to purchase food and other essential household items only. (Source: <http://www.humanservices.gov.au/customer/services/centrelink/income-management>)

There were also instances where money problems were experienced temporarily due to income issues, such as irregular timing in child maintenance payments and extended maternity leave:

*“Sometimes they [ex-partners] don’t pay [child maintenance] regularly and that throws us out with budgeting for the fortnight. I don’t think they [ex-partners] understand how hard it makes things sometimes”. (38 year old single Aboriginal and Torres Strait Islander mother of three children, works part-time and studies part-time)*

*“We did have a few problems awhile back when I wasn’t working [not getting a wage] and looking after the baby. But, everything’s good now”. (Aboriginal mother with one child, 28 years and partnered).*

As reported in Chapter 4, 19 of the thirty two participants (59%) were identified as food secure. Nevertheless, most of these participants were also concerned about the rising cost of living and how this would impact on their families in the future. In particular, a man of both Aboriginal and Torres Strait Islander heritage spoke of not having money issues, but mentioned the rising cost of living and the impact of this on household expenditure. An Aboriginal and Torres Strait Islander father of two children, 36 years and partnered, provided his experience.

*“...it’s becoming very expensive. Everything has just gone up...and not just food prices. It’s electricity, phone, fuel [for car], the cost of living in general has gone up a lot. You know, we [participant and his wife] are aware of how difficult it could be if one of us lost our job. And we don’t have much in savings. And if*

*there is an economic downturn that affects us, that's why we're trying to pay off as much of our mortgage now just to make sure that we have a buffer".*

The rise in cost of living was also mentioned by an Aboriginal woman.

*"Money isn't really an issue. My partner and I work full-time. Though living in Darwin is expensive and the place that we live in is falling apart and the owner still charges high rent!"* (Aboriginal mother of two children, 29 years and partnered).

#### **5.4.1.b Accessing food and enough food**

This sub-theme encompassed findings relevant to budgeting and managing money; misuse of money; and food access.

##### ***"Managing Money"***

At least five participants spoke of how important it is to budget or "manage money" to ensure enough money for food and bills. An Aboriginal woman shared her experiences and concerns.

*'...I've always planned a budget to include extras to make sure money for additional expenses such as car maintenance, power bills, etc. Though, power bills have gone up. Not because we're using more power, just the cost of power. Other things (essential items) are going up as well. You know, price of food, petrol, rent. So much pressure on families just to live. In our budget we always make sure the rent and bills are paid and there's money for food. You know, the kids come first. Make sure they're clothed, fed, school fees paid. Sometimes I may*

*need new clothing, shoes, or whatever, but will go without to make sure the kids have what they need. Just make sure I have what I need budgeted for and save for it.* ' (Aboriginal mother with three children, 25 years and partnered).

Another female participant shared her experiences in managing money. This participant lived in a home owned by her father and shared with her father and sister's family. The participant and her sister paid board and contributed to paying the bills.

*"....We give him [father] a certain amount of money a fortnight [board]. Say, like before it used to be me paying \$400 I give him for that fortnight. Now I don't do that, I pay Dad fortnightly [board] and pay extra for the bills – power and water bill. So, that's on a fortnightly basis".* (Aboriginal mother of three children, 34 years and single).

For some participants, budgeting did not always prevent "money tight" when the 'big bills' came in.

*"...Sometimes things [budget] blows out and I think I mentioned it before. One month you might get your electricity bill and that. Plus we have child care fees and that's a big chunk out of that as well".* (Aboriginal and Torres Strait Islander father of two children, 36 years and partnered).

As mentioned previously, four participants had a portion of their income automatically quarantined through Centrelink for food and other household essentials that was accessed through use of a Basics card. There were mixed experiences with

this system and two mentioned post-introduction of income management that money problems still occurred, whilst another two experienced improvements.

*“It’s ok. I don’t get much humbug<sup>12</sup> now [since introduction of basics card] for money and have enough money for food”. (Aboriginal grandmother, carer of 10 grandchildren, 44 years and recently widowed).*

### ***“Money gets wasted”***

Although interviewees referred to their personal struggles with managing money to meet family needs, many participants expressed that there were families in worse situations than themselves, particularly when anti-social behaviour such as gambling, excessive alcohol and illicit drug use were involved. Participants defined anti-social behaviour as that of ‘social problems’ and spoke of causal links with food and money problems.

*“I think these families are doing it tough. Though, there are also problems with drinking [alcohol] and gambling. It makes me wonder sometimes, when people say they have no money to pay bills or buy food. They smoke [cigarettes], drink [alcohol] and gamble and don’t seem to understand this causes problems. When you have limited money, need to be smart about how to use it”. (Aboriginal and Torres Strait Islander mother of three, 38 years and single).*

*“Other families find it hard too [money problems]. That’s why some people sell drugs. Need more money. But they also have problems with gambling and drinking [alcohol]. Maybe drugs too. A lot of money gets wasted that way.*

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<sup>12</sup> **Humbug** is a term predominantly used by Indigenous Australians in a way that means ‘to pester’, as in being *pestered* (humbugged) by someone for money.

*Make me sorry for the kids*". (Aboriginal and Torres Strait Islander mother of five, 29 years and partnered).

Then there were participants whom were directly affected by others' social problems.

*"My brother is bad. All he wants to do is drink grog [alcohol]. Then he gets hungry and comes here. Eats all my kids' tucker [food]. He takes money from me and Nanna. Other people after him cos' he steal grog [alcohol] from them"*. (Aboriginal mother of two, 25 years and partnered).

### ***"Getting to the shops"***

This sub-theme covered the ability to access food (shops) and reliable transport. Eleven participants mentioned their experience with accessing shops and how this impacted on food purchasing as well as seeking out food specials and bargains. Included in discussions was the importance of transportation in food access.

Having access to supermarkets was considered by most participants as important to obtain affordable food items. Supermarkets were considered by participants as often cheaper and offering a wider variety of goods when compared to the smaller convenience type stores.

*"..... I can go to Coles or Woolies<sup>13</sup> now more than once a week. The shop [small supermarket] down the road is very expensive. [I] Used to go there for bread and milk and other stuff if we run out"*. (Aboriginal and Torres Strait Islander mother of five, 25 years and partnered).

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<sup>13</sup> Coles and Woolworths (also known as Safeway in some States) are major supermarket chains throughout Australia.

During the study period a major supermarket chain outlet accessed by a quarter of the participants was closed. The only other food outlet option locally available to these participants was the service station<sup>14</sup> which had only a small range of goods and was expensive.

A 33 year old single Aboriginal and Torres Strait Islander woman with four children, gave an account of her dilemma.

*“[I] find it hard with shopping since local supermarket closed. Shopping Centre not within walking distance but was a short drive from my house and [I] relied on a lift or taxi that didn’t cost very much. Now [I] have to pay more for taxis, as [I] travel further to go shopping”.*

Different modes of transport were used for food shopping by participants, however, access to a reliable car, particularly a privately-owned car, was said to help the most:

*“We didn’t have a car before, but have one now. Made it easier to get around and do the shopping”.* (Aboriginal and Torres Strait Islander mother of five children, 29 years and partnered).

*“I read the junk mail and find out where the specials are. I work part-time and have my own car. So have the transport and time to shop around and ‘chase’ the specials”.* (Aboriginal father of five children, 42 years and a widower).

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<sup>14</sup> A Service Station is a motor vehicle fuel outlet and often provides a small range of grocery items, including bread, milk, juice and a few dry goods lines.

*“I don’t have transport problems and can go to the places I want to shop. Usually follow the bargains and try to buy in bulk”.* (Aboriginal and Torres Strait Islander mother of three, 38 years and single).

*“ I have a car and it’s reliable. Always keep it maintained. Don’t know what I’d do without it. I rely on my car to get me around, go to work, pick the kids up, go shopping”.* (Aboriginal mother of three, 25 years and partnered).

Participants who accessed public transport, particularly buses, found it difficult when travelling with small children. Using taxis was another option, though this was expensive particularly when available funds were limited.

*“I catch the bus and walk around a lot. I shop where close and buy little bits at [a] time, have to carry home.* (Aboriginal mother with seven children, 26 years and single).

*“Hard to take the bus with a baby and a two year old to go shop or clinic [health centre]”.* (Aboriginal mother of two children, 25 years and partnered).



### 5.4.2. Minor Influencing Factors

Social pressures, emotional wellbeing and housing featured prominently in discussions of food security with at least one-third of the participants.

#### 5.4.2.a *“Don’t want the kids to miss out”*

Four participants spoke in detail about their school-aged children requiring money for entertainment and social occasions, which put a strain on family income. To a lesser degree, there were other families that mentioned the same. Participants referred to not wanting their children “to go without” (not having electronic games, or toys and/or money to buy lollies after school at the shop), or miss out on experiences (such as the Darwin Show weekend or ‘Cracker night’ to celebrate Territory day) that their children’s peers were perceived to have.

*“We have problems sometimes with having enough money ....only when we have visitors or things the kids want to go to, like the [Darwin] Show. All the other kids going to the Show and our kids don’t want to miss out. It’s only fair for them, they only kids and should enjoy themselves. (Aboriginal Grandmother of 10 grandchildren, 44 years and recently widowed).*

*“Hard sometimes with money, giving the kids money to go places, like the [Darwin] Show. All their friends go and they want to go too. Give them money to go, so they don’t miss out. I like my kids to be happy and have things. We make do”. (Aboriginal mother of seven children, 26 years and single).*

A few families also mentioned children wanting to be included in regular activities and parents not wanting their children to miss out.

*“Kid’s like to buy from the school shop [tuckshop] like the other kids. Sometimes I really don’t have enough money, but give them anyway. I don’t want other kids at school to think my kids are poor”* (Aboriginal mother of seven children, 26 years and single).

#### **5.4.2.b “I used to get sad a lot”**

At least two thirds of participants openly discussed their feelings of how they felt emotionally and how this was related to their current situation. Mentioned among 11 participants were feelings of being stressed, down, sad, lonely and also of frustration or inadequacy in being a good provider for their children. Some participants referred to stressful situations where the household food routine was affected.

Two of the four participants receiving Centrelink payments and involved in the income management scheme referred to the stigma of shopping with a Basics Card and the feeling of frustration and ‘shame’<sup>15</sup> in having little control over managing their finances. These two participants also believed they did not need to be income managed and described feelings of public humiliation when not having enough money on the Basic card for groceries.

*“Real shame job [embarrassed] for me to go shop and find out don’t have enough money on the card [Basic card] to pay for groceries. Have to leave everything – trolley and all – with everyone watching. Make me real shame”.*

(Aboriginal mother of two children, 25 years and partnered).

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<sup>15</sup> **Shame or shame job** is a term used by Aboriginal and Torres Strait Islander peoples as feeling embarrassed either about themselves or others. I.e. feeling shame job because no money on the card to purchase groceries and others looking on. Or, feeling shame for someone else in a similar situation.

Other participants raised and spoke about wellbeing related issues with relevance to food and money. In particular these were emotions of feeling down or sad due to relationship breakdowns and family stresses.

*“I used to get sad a lot and not able to look after the kids properly. My mum and dad helped me [with looking after the children] and making sure there’s money for food and bills. I’m lucky to have them [mum and dad] here for support”.*

(Aboriginal mother of three children, 34 years and single).

#### **5.4.2.c “The house needs fixing”**

Of the 30 participants, four were owner-occupiers with seven renting privately and nineteen renting through public housing. A third of the participants in rental properties discussed problems with general home maintenance, specifically with kitchen maintenance. Home maintenance issues discussed were problems with window fly screens, kitchen benches, kitchen cupboards and stoves.

*“....There are no flyscreens on some of the windows and in others there are holes. The rats get in at night and sometimes [we] can see and hear them running in the house. Sometime they run over us in our sleep!”* (Aboriginal mother of four children, 34 years and partnered).

*“The house needs fixing. My grandchildren break things. You tell someone [about fixing the house] and they take long time to do something about it”.*

(Aboriginal grandmother of 10 children, 44 years and recently widowed).

Other participants experienced issues specifically with food storage, preparation and cooking. At least five participants in rental properties reported problems with a functional kitchen and again in requesting home maintenance.

*“...We’ve told him [owner] about the kitchen cupboards falling apart and other problems in the house. Just doesn’t seem to want to do anything about it...”*

(Aboriginal mother of two children, 29 years and partnered).

*“We can’t use the benches properly ‘cause the tiles are broken and dirty (bench top is tiled). The stove doesn’t work either”. “We told housing [public housing authority] we have problems months ago, but they still haven’t come to fix them. All we do is wait and see what happens”* (Aboriginal mother of four children, 34 years and partnered).

*“My stove don’t work. I cook outside or use the gas burner [inside the house] when it rains”* (Aboriginal grandmother of 10 children, 44 years and recently widowed)

A participant in an owner occupied home, provided an account of her family’s experiences with preparing meals when without a stove.

*“..our stove wasn’t working for a while, we wasn’t good [meals were limited]. Dad got new one [stove] and we all now have a chance of cooking”.* (Aboriginal mother of three children, 34 years and single).

An account provided by a participant in a an owner occupied home, indicated having adequate food storage space as essential for weekly or fortnightly food purchases.

*“.. we buy frozen vegies as well, because they last longer and we have them on hand to put in our food [cooking]. Well that helps with us. So having a freezer helps as well [with food storage]”.* (Aboriginal and Torres Strait Islander father of two children, 36 years and partnered).

In contrast, a participant who did not have adequate cold food storage mentioned how having this facility would allow for purchasing of larger quantities of food.

*“I have what I need in the house. [I] Need a freezer. That way can buy more meat and put away, instead of going to the shop every day to buy meat for dinner”.* (Aboriginal mother of seven children, 26 years and single).

## **5.5. Impact on Food Selection**

Within this theme are sub themes that encompass participants’ views regarding food affordability; relationship between food and health; and food behaviour in association with food insecurity.

### ***5.5.1.a “Not everyone can afford to be healthy”***

Throughout discussions with participants, many references to food and health were made, particularly the benefits of consuming home prepared meals rather than take-away meals perceived as high in fat and sugar. Four participants spoke in-depth about fresh fruit and vegetables being ‘healthy’ foods and important in the prevention of illnesses such as type 2 diabetes. These foods though were considered expensive and not always affordable when compared with other less healthy food options. The cost of food was considered important in planning meals and budgeting

for household expenses. At least half of the participants referred to the high cost of food influencing food choice.

An Aboriginal woman conveyed her understanding of the relationship with food and good health, yet felt she was unable to put this message into practice due to limited money and high food costs.

*“[I] Find it hard sometimes to eat healthy like have fruit and vegetables every day. Sometimes [it’s a] bit tight with money and [I] buy food that fills you up. Fruit doesn’t [fill you up] and it’s expensive. ....Always hear about why important to eat healthy to stop diseases like diabetes, but when you try to, it’s very expensive. (Aboriginal mother of three children, 29 years and partnered).*

*“We’re told to eat right, exercise and be healthy, but it’s hard when everything costs so much to be healthy. Not everyone can afford to be healthy”. (Torres Strait Islander mother of four children, 30 years and partnered).*

In contrast where money for food was not considered an issue, one woman spoke of not wanting her children to eat too much processed foods and have more natural foods in their diets.

*“I like my children to eat fresh food and foods that are not over processed. Also, processed foods tend to have a lot of sugar and that’s no good”. (Aboriginal mother of two children, 29 years and partnered).*

#### **5.5.1.b. “Something to fill our bellies”**

Participants referred to compromising food quality for quantity to ensure that there was enough to eat at each meal. Most participants spoke of the importance of eating healthy food at meal times. However, for some this was not always feasible and most important to these participants was ensuring enough food to eat.

*“May not be healthy (food), but we all are getting something to eat. Don’t buy much takeaway, so can have unhealthy food sometimes hey?”* (Aboriginal mother of three children, 25 years and partnered).

*“I make sure my kids are fed and don’t go without. Some of our meals are not that healthy, but at least we have something to fill our bellies”.* (Aboriginal and Torres Strait Islander mother of three, 38 years and single).

*“We can afford food, but not always healthy food. Sometimes, have hamper [tinned corned beef] and rice with bread for dinner. It’s filling and the kids are not hungry”.* (non-Indigenous mother of four children, 30 years and partnered).

Some participants referred to strategies used to ensure the family did not go without a meal.

*“...Usually try to buy in bulk and cook meals in bulk to freeze and use later. Therefore, make sure my daughter never goes without food”.* (non-Indigenous mother of one, 28 years and single).

### 5.5.1.c. *“Making the meal stretch”*

In discussions, most participants mentioned the use of low cost starchy foods, such as rice, pasta and bread to ‘fill children up between meals’ or add quantity to ‘bulk up’ meals when unexpected visitors joined in a meal or to use up leftover foods.

*“...If not enough food for each meal, cook more rice or have bread. This fills you up. Only time this happens is when we have unexpected visitors at dinnertime [evening meal] and we have to stretch the food so everyone has something”.* (Aboriginal mother of three children, 34 years and single).

*“I make sure kids always eat weet-bix [wheat biscuits breakfast cereal] in the morning before go to school. Have something at school from the shop [school tuckshop] and when they get home usually have bread with something on it. Boys eat a lot and bread is cheap and fills them up”.* (Aboriginal mother of seven children, 26 years and single).

*“...We’ve bulked up a left over meal, not because we’re short of money, but because we just can’t be bothered cooking up a whole new meal. Yeah, you’ve got leftovers [food from previous meals] and you just add something to it or cook up a fresh batch of rice to stretch it out”.* (Aboriginal father of one child, 38 years and partnered).

Another male participant spoke of his family’s experiences with using up left over food and filler foods to bulk up meals.

*“ It’s sort of a standard way (having rice) of making the meal stretch. Not that having enough food is an issue. But when we have leftovers, it’s a, way of making*



*sure we have enough”* (Aboriginal and Torres Strait Islander father of two, 36 years and partnered).

## **5.6. Coping Strategies**

As a coping strategy, social support in the form of accessing extended family was the most prominent form of assistance sought by participants to prevent or help alleviate food insecurity.

### **5.6.1. “Live with mum and dad, they help out a lot”**

Extended family provided the most common form of support and the types of support sought were mainly for money and food, but for some families it was assistance with looking after children. For four participants, assistance was sought regularly where others sought assistance only when there were additional demands placed on the household income. Running out of money and/ or food was the most common reason for accessing social support and usually occurred during ‘money tight’ times when the ‘big bills’ were due for payment.

An Aboriginal woman with a family and who lived with her parents spoke of how this living arrangement assisted with expenses and provided support with looking after the children.

*“Sometimes have problems with money. Especially when the bills come in at once and don’t always have enough to buy food. My three kids and me live at home with my mum and dad. This makes it easier for when I run out of money. Mum and dad have money for food”.* (Aboriginal mother of three children, 34 years and single).

Other participants shared their experiences with accessing family for assistance when experiencing difficulties.

*“My partner has family here and if we don’t have food, or money for food, we go over to family’s place for dinner [evening meal]. Or if someone has money, we’ll lend money. Our home is open to family if we have food and someone wants something to eat or money. But I always make sure we have enough for ourselves first”.* (non-Indigenous mother of four, 30 years and partnered).

*“We do have problems with food sometimes. Especially when we get big bills and there’s not enough money for food. Usually, go to my mum and dad to ask for money or food. Glad I have them. Don’t know where I would go otherwise for help”.* (Aboriginal and Torres Strait Islander mother of five children, 29 years and partnered).

There were also instances where three participants who had limited or no social support found it difficult.

*“I am not from Darwin and don’t really have family here. My mother is visiting and I know some people from the community where I come from. Bit lonely sometimes”.* (Aboriginal mother of seven children, 26 years and single).

In other cases, participants who personally did not require social support spoke of others they knew of who did.

*“There are families that do have problems, some serious. I know some people having to go to other family members and ask for money or food”.* (Aboriginal mother of one child, 28 years and partnered).

Four participants received support from family with household chores and looking after children.

*“We haven’t relied on family to help us out with feeding us, only with looking after the baby and other household chores when my wife was sick”.* (Aboriginal father of one child, 38 years and partnered).

From discussions, most participants mentioned that living with immediate family members (parents or siblings) reduced the financial burden of expenses and assisted with raising the children. Almost one third of the participants lived with extended family and seemed to be in this arrangement for similar reasons.

*“My three kids and me live at home with mum and dad. This makes it easier for when I run out of money”.* (Aboriginal mother of three, 34 years and single).

*“Yes, have problems with food security. Live with mum and dad, they help out a lot with food and paying the bills”.* (Aboriginal and Torres Strait Islander mother of four children, 30 years and partnered).

An Aboriginal woman spoke of her situation where her family had recently moved in with her parents.

*“We used to be in government housing, but now me and my partner earn too much and had to give up our house and find a private house to rent. But we can’t afford to pay private rent. Too much and won’t have much money left for food and other things we need. Me, my partner and the kids moved in with my mum*

*and dad. That way we can save money to buy our own house”*’. (Aboriginal mother of three children, 29 years and partnered).

A mother of one, recently separated from her partner (of Aboriginal descent) spoke of having to move in with her family to cope with expenses.

*“My ex [partner] moved out about 2 months ago and it was hard paying the rent and bills, so [I] decided to move out to Palmerston and be with my family. Too expensive living in Darwin. [I] Don’t know how other people like me can live there”*. (non-Indigenous mother of one child, 28 years and single).

#### **5.6.2. *We don’t have it as bad as other families”***

From discussions, most participants relayed experiences of food insecurity, whether occasional when “money tight” or regularly when there was not enough money at all. However, the reference made by many participants experiencing food insecurity to others being in a worse situation to their own seemed to be a form of coping by convincing themselves that their circumstances were not as bad as others.

*“We are doing better than some other families. I know some have to ask for food vouchers [from Centrelink] to buy groceries”*. (Aboriginal and Torres Strait Islander mother of three children, 38 years and single).

*“We don’t have it bad as some families. At least we always have something to eat, bills are paid and [have] petrol for the car”*. (Non-Indigenous mother of four children, 30 years and partnered)

*“We don’t really have problems. [We] Are better off than other families we know. We are now able to meet needs. There are others that have serious problems with making ends meet”. (Aboriginal mother of three children, 25 years and partnered).*

*“I think there are a lot of people worse off than us. I am lucky because I have a family who have a great deal of understanding for each other. (Aboriginal mother of three children, 34 years and single).*

*“It makes you feel a bit easier to know that your situation is bad, but that someone else is worse off to make yourself feel better or make light of your current situation. I don’t know, but I think that it’s across the board [whole population]” (Aboriginal father of one child , 38 years and partnered).*

## **5.7. Discussion**

In this cohort of Indigenous Australian carers, there were common features that contributed to household food security issues and mechanisms of coping. The key points are discussed below.

The first finding within this study was that participants did not initially identify with being food insecure, although many participants' experiences indicated otherwise. In general, participants accepted the situation of running out of money, food or both, and having to seek assistance from relatives as a normal experience. A study by Chan and others (2006) in six Inuit communities of Nunavut, Canada, focussed on the availability and accessibility of traditional and market foods, foods purchased from a shop. Noted within Chan et al.'s (2006) study was a similar incongruence to that reported by this study between perceived food security status and experiences in obtaining enough food to eat. In contrast, a study undertaken by Ford and colleagues (2012) also within an Inuit population from Nunavut, found participants who reported food insecurity also reported regular use of community food programs to assist with alleviating hunger. Unlike Chan et al.'s (2006) study, Ford et al. (2012) recruited participants who were registered with food assistance programs. These participants may have shared characteristics with those considered by this study's participants as "worse off".

A second finding was that for most, food insecurity was experienced occasionally and usually when larger bills were due for payment. However, for some, food insecurity was a chronic problem and seemed to be often due to an inadequate or irregular income. Participants that reported to have enough money to meet their

needs, tended to be in paid employment. Secure employment and stable housing have been shown in other studies to be strongly associated with food security (Ford et al. 2012; Stevens 2010; De Marco et al. 2002). In contrast seasonal employment (De Marco et al. 2009; Quandt et al. 2006), unemployment and underemployment<sup>16</sup> (Ford et al. 2012; Sim et al. 2011; Stevens 2010; Chan et al. 2006; Hamelin et al. 2008; Hamelin et al. 2002; Hoisington et al. 2002) have been reported as problematic in ensuring a regular income to afford food and other expenses among those experiencing food insecurity. For instance, Quandt and others (2006) found that among Latino immigrant families within North Carolina, US, not having enough food was cyclical and related to a decrease in income due to limited availability of paid work (seasonal work).

In this study, participants with and without employment referred to the cost of living as contributing to their food insecurity experiences. For example, some participants purposely lived with extended family to mitigate potential food insecurity with the rising cost of living, even though they reported earning an adequate income. This was also found by Chan and other's (2006) where the cost of living and cash flow among the 'working poor' negatively impacted on their food security in Nunavut communities. A study by Stevens (2010) in a US urban centre, found the cost of home rental was the single biggest factor identified among a group of young mothers as contributing to food insecurity. In the current study, not only was high rent a contributing factor to the high cost of living and food insecurity experiences, but

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<sup>16</sup> The underemployment classification includes those workers that are highly skilled but work in low paid jobs; workers that are highly skilled but work in low skill jobs and part-time workers that would prefer to be full-time. This is different from unemployment in that the individual is working but isn't working at their full capability.  
(Source: <http://www.investopedia.com/terms/u/underemployment.asp>)

issues with maintenance of housing and inadequate kitchen facilities were also associated with their experiences of food insecurity.

The experience amongst this study population of “money tight” due to the payment of large bills and general cost of living has also been reported by other researchers investigating food security experiences and influencing factors (Stevens et al. 2010; De Marco et al. 2009; Quandt et al. 2006). Within these studies, participants were either low income earners or recipients of welfare (government payments) and received support through government and non-government food and nutrition assistance programs. Food insecurity occurred when money ‘ran out’ before the next pay period and food and nutrition assistance was accessed at these times to alleviate food insecurity over the short term. This is in contrast to the findings of this study, where participants did not report to access food assistance programs.

A third finding from this study is participants dealt with intermittent food insecurity through a number of coping strategies. These coping strategies did not appear to involve seeking assistance from relevant agencies to alleviate food insecurity. Instead, strategies participants put in place during the “money tight” times were to delay payment or undertake part payment of larger bills through staggered payments, or to cut back “luxury foods”, such as sweets, soft drinks and desserts. Similar coping strategies were reported by Hoisington and others (2002) among a group of 90 food pantry users in Washington, US, that included participants of African American, Hispanic and Native American background. These coping strategies included putting off paying bills and of using up leftover food, making food in bulk and freezing food for later use (Hoisington et al. 2002). A study among Latino



immigrant families in North Carolina, US, also reported participants coped with times of food insecurity by reducing purchase of foods considered expensive, such as meats and fruits and unnecessary foods, such as ‘soft drinks, snacks and eating out’ (Quandt et al. 2006:2641).

The strategies employed to cope with “money tight” times in this study were seen to be both positive and negative in respect to food behaviour and health. The selection of less expensive foods that participants referred to and/ or limiting purchase or excluding non-essential foods termed “luxury foods”, such as sweets, desserts and soft drinks are examples of positive responses to food insecurity. In other similar studies, shopping for specials, bulk-buying, cooking in bulk and freezing food portions are examples of other pragmatic responses (Stevens 2010; De Marco et al. 2009; Quandt et al. 2006; Hoisington et al. 2002). Similar practices as positive coping responses to food insecurity were referred to by participants within the current study. However, also reported in other similar studies are negative responses to food insecurity that include forgoing healthier food options and choosing cheaper less healthier foods, reducing meal size or going without to ensure children eat, are further examples of negative responses to food insecurity (Stevens 2010; De Marco et al. 2009; Hamelin et al. 2008; Quandt et al. 2006; Hoisington et al. 2002). Similar responses were reported in this study particularly at “money tight” times.

There is debate to whether the behavioural purchase of unhealthy foods in preference to healthy foods is driven by need, due to healthy food not being affordable (Ford et al. 2012; Hamelin et al. 2008; Chan et al. 2006; Eikenberry et al. 2004), or by poor dietary habits, established food preferences and poor food purchasing knowledge

(Chan et al. 2006; Kempson et al. 2003). Other studies have also reported poor eating habits among high and low income earners as being due to laziness (Eikenberry et al. 2004) and time constraints (Eikenberry et al. 2004; Inglis et al. 2005; Hoisington et al. 2002). In the current study, as similar to other studies, participants perceived healthier food to be more expensive to less healthy food and expressed frustrations at not always being able to afford healthier food options and bewilderment at why unhealthier foods appeared cheaper. Other studies have reported the cost of healthy food options as a barrier to healthy eating and have commented that low income gave participants little option but to buy cheaper highly refined and energy dense foods (Brimblecombe et al. 2014; Stevens 2010; Chan et al. 2006). Similarly, a study by Adams and colleagues (2012) within a low income urban Australian Aboriginal population, found participants had an understanding of what were healthy foods, but were not always able to afford these foods. The same was reported by Brimblecombe et al. (2014) for an Aboriginal population in remote Australia where participants perceived healthy food to be unaffordable.

A fourth finding is concerns for children's needs often characterised people's food behaviour responses to food insecurity. Hamelin and others (2002) also noted experiences of anxiety by some participants in ensuring enough food for the children and the accompanying feelings of despair. Upon similar lines, within this study a few participants expressed concerns for the acceptance and social inclusion of their children by peers and how this exacerbated the risk of food insecurity due to allocation of limited food money to non-food items or entertainment.

Use of a private vehicle, as reported within the current study to access food outlets, enabled people to seek out food bargains and specials. In particular, access to a private vehicle was advantageous in accessing larger supermarkets where food was often cheaper and of more variety. This was also noted by Stevens (2010), De Marco et al. (2009), Coveney et al. (2009), Kempson et al. (2003) and Martin et al. (2003), where public transport (buses and taxis) were considered by participants as unreliable, inconvenient or expensive and therefore, found to negatively impact on food security. In this study, participants with transportation issues were left having to access smaller food outlets close by that were limited in food variety, particularly healthy foods, and more expensive.

Finally, unlike the variety of social support systems accessed by other populations experiencing food insecurity, such as food assistance programs, food charity organisations, faith communities, neighbours and friends (Adams et al. 2012; Ford et al. 2012; Sim et al. 2011; Stevens 2010; Chan et al. 2009; De Marco et al. 2009; Hamelin et al. 2008; Quandt et al. 2006; Kempson et al. 2003; Hoisington et al. 2002; Hamelin et al. 2002), this study is unique in that family support was the only resource reported to be accessed for assistance. Other studies have also identified the extended family as a social support system (Ford et al. 2012; Sim et al. 2011; Stevens 2010; Quandt et al. 2006; Kempson et al. 2003; Hoisington et al. 2002) and identified support from friends and neighbours as a main coping mechanism (De Marco et al. 2009) in response to food insecurity. Only one study however, mentioned living with family as a temporary measure until housing was obtained (Ford et al. 2006). Residing with family members, particularly parents, was mentioned within the

current study as a way for families to cope with living expenses. For some, this arrangement also provided support with child care.

Central to the study participants' social support system, was the action of reciprocity where families coped through inter-reliance on each other for food, money and other necessities. For instance, participants reported that when their families had food, they would provide for other extended family members. Then when the family had 'run out', extended family would assist in return. Reciprocity was also mentioned in Stevens' (2010) study, where young mothers would rely on family members for assistance with food and then 'return the favour' when family members experienced difficulties.

Within this study, as with other literature (Broome 1994) reciprocity forms a cultural practice of sharing among Indigenous Australians that is important in maintaining and reinforcing cultural social bonds with individual and group relationships. As noted by Chan et al. (2006) and Ford et al. (2012), reciprocity has a place in maintaining and reinforcing family and broader community relationship obligations as well as cultural identity and practice among Inuit. Also reported by both Chan et al. (2006) and Ford et al. (2012), Inuit participants referred to the importance of 'cultural sharing' (Chan et al. 2006) and 'sharing networks' (Ford et al. 2012) with reference to sharing out traditional foods from hunting among families and ensuring excess is provided to the more vulnerable members of the community who cannot obtain these foods. For those who could not hunt, money or other services were exchanged for traditional foods to keep with continuing cultural practices (Ford et al. 2012; Chan et al. 2006). This concept of sharing traditional foods in a reciprocated

environment to help each other out is also evident in this study where assistance was sought and provided within families. Also of interest is a study undertaken by Quandt et al. (2006) of Latino immigrant families in North Carolina, US. Highlighted was the importance of sending money home to families. This action was justifiable from the belief family back in their country of origin were in a worse situation to their own and it was also cultural obligation to look after ones' parents (Quandt et al. 2006).

Discussions with participants within this study identified reciprocation as an expectation, and a given cultural practice to maintain family relationships. It is important to note sharing support structures are also fragile and relationship upsets can result in limited or no support as experienced by a participant. For example in this study, a falling out with a family member led to a young mother of two to seek support elsewhere of which was limited and resulted in food and money problems. It is of interest to note seeking assistance from family was not reported in the study by Adams et al (2012) of which was also undertaken in an urban Indigenous Australian population. A food insecurity study undertaken by Markwick et al. (2014) in the Aboriginal and Torres Strait Islander population living in Victoria, requested information about social support and receiving assistance from family and friends. Findings indicated accessing family and friends for assistance was not reported by this population (Markwick et al. 2014).

## 5.8. Summary

As outlined in the findings (sections 5.2-5.6) and figure 5.1, four main themes with inclusion of subthemes were identified from the in-depth interviews with participants. These were; *Experiences of Food Insecurity*, specifically the perception of food insecurity as a normal experience; *Influencing factors*, being Major and Minor Influencing factors that directly affected participants' food security experiences; *Impact on Food Selection*, being participants' views of food affordability, relationship between food and health and food behaviour with reference to food insecurity; and, finally, *Coping Strategies* as mechanisms in forms of assistance used to prevent or help alleviate food insecurity.

From what has been discussed, Indigenous Australian families within this study have had varying experiences with food insecurity. If these experiences did not directly affect participants, there was knowledge of others' food insecurity experiences and these were spoken about. It is evident from discussions that a major contributor to food insecurity is limited financial resources in conjunction with rising living costs and a majority reported it as a temporary situation when the larger bills were due for payment. However, for some this was more a chronic problem where expenses outweighed income. An interesting finding is that the concepts of food security/insecurity were unknown to the study participants. This is especially when the experiences relayed indicated challenges with having enough food and/ or money and coping strategies employed albeit as a temporary measure. Not having enough money to buy food and take care of living expenses appears to be a universal experience for those on limited incomes. Similarly, the participants in this study described that having a limited income impacted on their circumstances and that

other factors impacted on food security, including transport and concern for social image

The extended family for this study population was the major form of support for assistance and played possibly a broader cultural role in sharing as identified among Inuit populations by Chan et al. (2006) and Ford et al. (2012). This was also a reciprocated arrangement where families would help each other out. However, it could also be considered fragile as support was very reliant on harmonious relationships between family members and may be considered only functional when relationships are. External programs that provide assistance in the forms of food vouchers and charity organisations providing meals and food parcels are available within the study location. These services were not mentioned by participants as being accessed for assistance. However, this finding should be interpreted with caution as participants may have chosen not to share this information and seeking knowledge about access to such services was not the purpose of the study.

Findings from two studies (Stevens 2010; De Marco et al. 2009) indicated the importance of furthering education to gain employment or improve opportunities for higher paid work as a long term solution to overcoming food insecurity. With the current study, undertaking further study for betterment of gaining new skills and applying for higher paid jobs was not mentioned as a long-term strategy to overcome food security issues by the study population. A possible reason may lie with the initial study finding where participants did not identify with being food insecure and therefore, not considered a problem to overcome. Also, participants spoke of having a supportive family network and these arrangements may maintain food security.

## **5.9. Study Strengths, limitations and Implications**

### **5.9.1 Strengths**

Unlike other similar published research, a strength of this study is participant sampling in that recruitment was not undertaken through food assistance programs. This study therefore, provides a broader view of food security experiences from a perspective where people are either experiencing food insecurity or not.

This qualitative study is only one part of the broader study reported in this thesis. Although the sample size is small, conversations and in-depth interviews revealed consistency in the development and consolidation of themes. A point was also reached during data collection where no new information was forthcoming, data saturation point reached.

As outlined in Chapter 2, section 2.1, I am of Aboriginal ancestry and am a Public Health Nutritionist. My cultural heritage was a positive in communicating and establishing a trusting relationship with participants. Also of importance, is in the cultural and social understandings specific to Indigenous Australians that were captured within the initial and in-depth interviews, which I conducted.

As described, the study was undertaken in two urban locations and caution is required in generalising findings to other similar populations. The study design and methodology could be considered for future qualitative research investigating unexplored topics to generate new knowledge in learning more about Indigenous Australian peoples' understandings and experiences of food security.



Finally, this qualitative research has unveiled ‘new’ understandings of food insecurity experiences and coping strategies from an urban Indigenous Australian population perspective that otherwise, may have remained unknown to the broader community.

### **5.9.2 Limitations**

A sample size of 30 participants participated in initial discussions and the in-depth interviews and a majority of participants were from well-established families within the study locations. Therefore, the findings are more applicable to families who are long term residents with extended families. A recruitment strategy with inclusion of purposive sampling from identified Indigenous Australian residential sites within the study locations may have offered a broader understanding of peoples’ food insecurity experiences and coping mechanisms employed.

As has been identified earlier in this chapter, the majority of participants in this study are female (27 female and three male). There are possibilities of bias with findings reflecting the views of one gender more so than the other. Therefore, consideration in sampling to obtain a gender balance may have provided broader insight into the males’ food insecurity experiences and value added to the current findings. Further similar studies may need to consider recruitment and sampling strategies that address gender balance.

### **5.9.3 Implications**

Through discussions, it was clearly identified participants’ food insecurity experiences were related to monetary expenditure outweighing income, particularly

with the payment of the larger bills. It is important to note participants' concerns with meeting expenses and monetary expenditure appeared to be short term. Being in a situation where money is limited and expenses outweigh available funds, for this study population having money available to fulfil occasional needs such as attending to family and cultural obligations or meeting children's social requirements, has higher priority and requires available funds. A possible solution to assist with meeting payment of expenses is for direct debit option of smaller regular payments to coincide with pay periods. Potentially, this would entail regular payment of bills in smaller amounts and may have an effect on not placing families under undue financial pressure.

Transport, preferably access to a private car, was also deemed an essential by some to undertake food shopping. Since mentioned are barriers to undertaking a food shop and accessing 'healthy food', there could be possible scope for services and other assistance programs to consider these needs. For instance, food shopping assistance for older Australians and the disabled is provided through government and non-government services. Major supermarket chains such as Coles and Woolworths provide an online shopping and delivery service for a fee. This may not be available by all stores and may not appeal to all consumers. Consideration with access to a reliable and affordable internet connection and means to pay by credit-debit card online, are also factors to be taken into account with online shopping. However, it could be considered by government and non-government services to provide food shopping assistance, including a subsidised or free food shopping delivery service, for low income families with young children.

Of interest is the perception that the cost of healthy foods makes it unaffordable for families within this study population. From discussions, this referred to fresh fruit and vegetables and the importance in prevention of chronic disease, such as type 2 diabetes. Therefore, it would be of importance for policy planning to consider economic access to healthy foods as a strategy for improved health incomes. A potential solution may require policy level consideration, where food subsidies or similar ensure availability of affordable healthy food options. There are also opportunities for local councils to consider availability of public allotments to encourage community or family group food gardening to supplement diets. Though, this option was not considered by study participants. The perception of fresh fruit and vegetables being costly is worth further research investigation, particularly in assessing the affordability of healthy foods within the study location.

From the perspective of appropriate and sustainable safety nets that provide assistance to families, it is important to acknowledge the existence of support services accessed by families that are not recognised within the mainstream and are specific to Indigenous Australians. These include positive family associations where support is provided for cultural reasons. One of the main coping strategies identified within this study was seeking assistance from family when food insecurity is experienced. Potential scope for current services is to consider an approach in connecting with family networks for provision of support services, such as financial counselling. Such services have potential to provide peer support family counselling where members experiencing difficulties are supported by family member(s) to engage with services and work through issues.



## CHAPTER 6

### STAGE 3 METHODS

Stage 3, the largest component of my thesis, was designed to answer the following objectives:

- 1. To compare health parameters of children aged 6 months – 4 years attending childcare centres living in food secure and food insecure households.*
- 2. To determine the performance of the modified US 18-item Module (mUS 18-item Module) within families of children attending child care centres.*

My specific research questions were:

- 1. What are the influencing factors associated with food security status within families whose children attend child care centres?*
- 2. Does food security status have an impact on child health outcomes?*
- 3. How reliable is the mUS 18-item Module in measuring household food security status in families whose children attend child care centres?*

## 6.1 Study Design

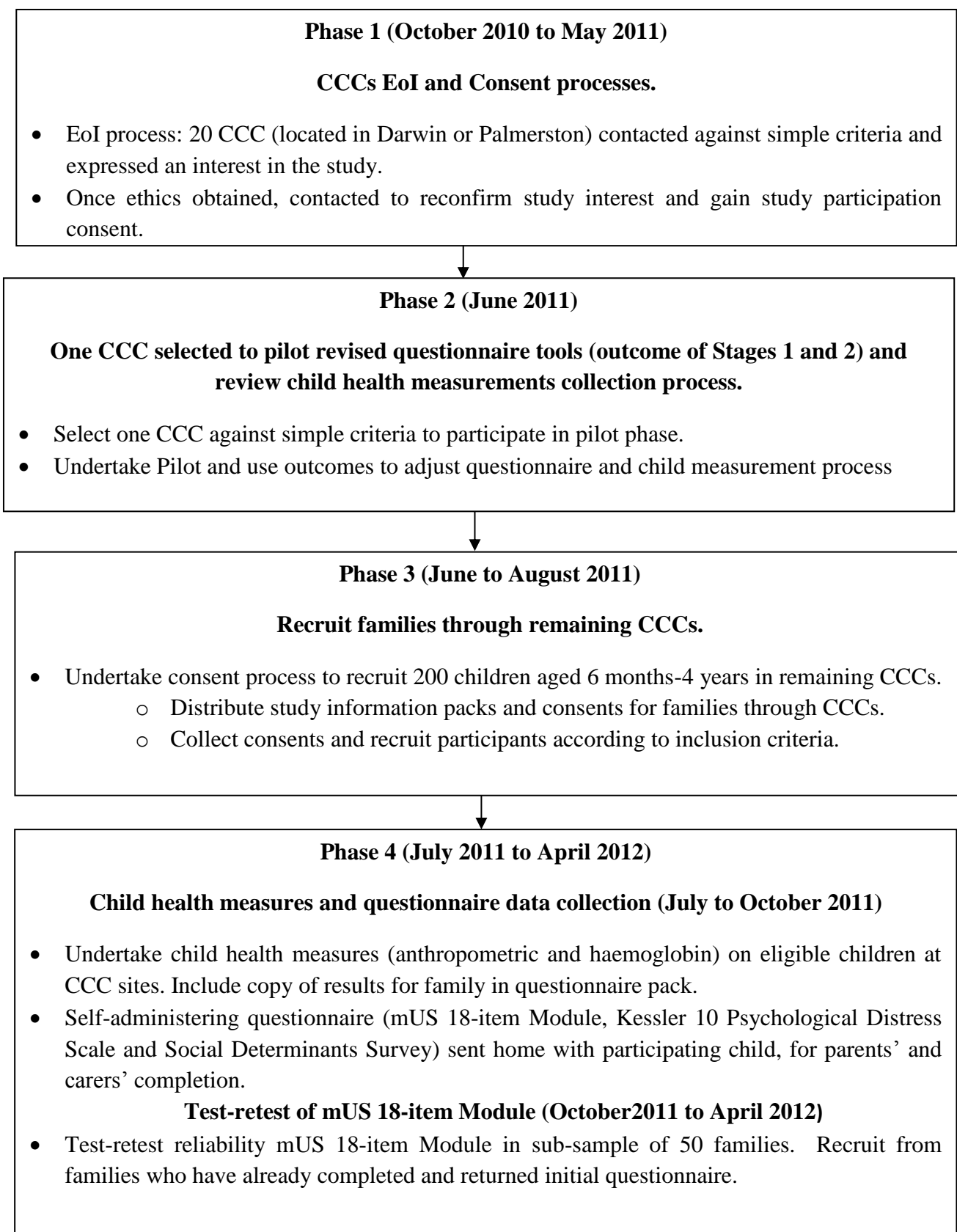
This Stage used a cross sectional study design. Questionnaires and child health measurements were undertaken to collect information about food security status; social determinants and psychological distress information; and child health outcomes. There were four phases to this stage that were instrumental in ensuring quality and ethical study processes were undertaken. It was imperative for Directors of Child Care Centres (CCC), in consultation with their governing bodies and staff, to be active decision makers and have a clear understanding of the research requirements. This was paramount for the support of my study and successful implementation. Briefly, the four phases (figure 6.1), undertaken between October 2010 and April 2012 consisted of:

- 1) CCC's Expression of Interest (EoI) and Recruitment processes.
- 2) Pilot data collection: One CCC selected to pilot test the data collection tools revised from Stages 1 and 2, and the child health measurements and researcher techniques used. Finalise any adjustments prior to study roll out to other CCCs
- 3) Recruiting of families: Undertake consent process with families to participate in study through the remaining CCCs,
- 4) Data Collection: Obtain child health measurements and questionnaire data from consenting families. As with Stage 1, a test-retest of the mUS 18-item Module was undertaken within a sub-group to test the repeatability of the tool.

Figure 6.1 depicts the overall approach of Stage 3 and the following text provides a more in-depth explanation of the process.

**Figure 6.1**

**Description of Stage 3 Study Process**



### **6.1.1. Phase 1: Child Care Centres Expression of Interest and Consent processes**

#### ***6.1.1.a. Initial Contact with Child Care Centres in Darwin and Palmerston***

In October 2010, a list of CCCs' contact details within Darwin and Palmerston was obtained with permission from a previous study where participants had been recruited through this avenue. As my PhD focused on urban-based families, CCCs located outside this specification were not included.

Once this process had been completed, eligible CCCs were telephoned and the Household Food Security Study was briefly discussed with the Director. If the Director expressed an interest, a package containing an Expression of Interest letter outlining the study process, study information sheet and an Expression of Interest form for completion and returned by either email or post. At this point, the CCC was only expressing an interest in the study and not providing consent to participate. The purpose of this exercise was to obtain support for Stage 3 of the study for the human research ethics process. It was also to have an indication of the number of CCCs willing to participate and gauge the number of CCCs required to obtain potential participants for the study. 19 CCCs expressed an interest to participate in the study and this process was completed by early January 2011.

#### **6.1.1.b. Recruitment of Child Care Centres**

In mid-April 2011, once ethical approval was granted, the 19 CCCs that expressed an interest in the study were contacted by telephone to firstly, reconfirm their interest and secondly, organise a time to meet and discuss the recruitment and process. Two of the 19 CCCs decided not to participate due to current commitments. Therefore, a total of 17 CCCs formed the study recruitment sites. The 17 CCCs were located in



socio-economic and culturally diverse areas within Darwin and Palmerston. Of the CCCs, four were located within high-income areas, 8 in middle-income and 5 in lower-income areas. All were located in culturally diverse areas.

Prior to gaining consent, I discussed with each director of the CCCs in detail what the study entailed and involvement of the CCC's staff. The research team's expectations of the Director and Centre staff to ensure we (Cate Wilson (a nurse) and I) minimised the burden of the CCCs Directors and Staff with the promotion and implementation of the study. The CCCs assisted the research through:

- Displaying study information posters and pamphlets for families within each Centre with researcher contact details.
- Provision of space within the Centre to undertake child health measurements.
- If applicable, availability of researcher in Centre during child pick up and drop off times to answer any queries families have about the study.
- Study information dissemination purposes, inclusion of study updates in Centres' Newsletters. I wrote and submitted quarterly study updates.
- Boxes for completed consent forms and questionnaires were provided, clearly labelled with the study's title and where practical, decorated by the children. Boxes were made available near the parents' and carers' sign in and out areas during operational hours and locked in the Directors' offices after hours. Completed consent forms and questionnaires were collected by the research team at the end of each day.

### ***6.1.2. Phase 2: Select Child Care Centre to pilot revised questionnaire and review child health measurement collection process***

This pilot phase was undertaken in June 2011. The qualitative outcomes of Stage 2 (Chapter 5) informed the data collection survey tools used in this component of the study. Piloting these revised tools in one CCC first before administering to all Centres allowed further adjustments to the questionnaires. It was also necessary to test the child health measures process and equipment prior to roll out with all Centres to ensure it was in working order. Simple selection criteria were used to select the most appropriate Centre for the pilot study. The selection criteria entailed:

- Ease of access for the research team;
- Low-socioeconomic and culturally diverse; and
- Willingness to participate.

The CCC selected for the pilot was culturally diverse, with a number of families with English as a second language, including Aboriginal and Torres Strait Islander families. This aspect was important with the wording and structure of questions and for ease of understanding. Prior to data collection, a study information session was undertaken with staff and this included information about the dissemination and collection of participant consent forms (Appendix 6.1) and questionnaire (Appendix 6.2). The inclusion criteria were:

- Child is aged between 6 months and 4 years.
- Child has resided in Darwin or Palmerston for 12 months or more.
- Child does not have a medical condition requiring food or nutrition supplements.

The pilot was undertaken over a four week period in June 2011 and parents or carers of eligible children were required to complete consent forms which were then collected by the research team. Once consents were collected and perused to ensure child eligibility and form completed correctly, questionnaires were placed in envelopes, addressed to the consenting parent or carer of the eligible child and hand delivered to the CCC's Director. Staff then placed the envelopes in the child's locker for parents and carers to complete. Prior to implementing the study, the research team discussed with the CCC Director options for providing parents and carers with assistance to complete the consent form and questionnaire. In particular, provide assistance for parents and carers who had difficulty in reading and understanding English. Since parents and carers were familiar with the CCC staff, the CCC Director proposed staff assist with this process. Fortunately, minimal assistance was required and it was not onerous on staff to assist parents and carers with study requirements.

After the data collection process with the pilot CCC, a survey requesting feedback on the questionnaire, in particular the length, time it took and wording of questions, (See Appendix 6.3) was administered to families to complete voluntarily. There was a good response with eight from 10 completed surveys returned with very useful suggestions. CCC staff were also forward in providing feedback about the child health measurements process, of which they were extremely positive. Forms used for the pilot phase are provided in the appendices:

- Appendix 6.1: Household Food Security Study Pilot Participant consent form.
- Appendix 6.2: Household Food Security Study Pilot Questionnaire.
- Appendix 6.3: Household Food Security Study Pilot feedback survey.

- Appendix 6.4: Adjustments made to questionnaire including coping strategy questions added to the mUS 18-item Module for Stage 3
- Appendix 6.5: Household Food Security Study procedures Child Health Measurements
- Appendix 6.6: Household Food Security Study Pilot Child health measurements data collection and feedback forms.

Following the pilot phase, minor adjustments to the consent, questionnaire and measurement's process were made before recruitment for the rest of the remaining CCCs. Presented in the following appendices are the revised documents from the Pilot process:

- Appendix 6.7: Household Food Security Study Stage 3 participant consent form.
- Appendix 6.8: Household food security study Stage 3 Child health measurements and feedback forms.

### ***6.1.3. Phase 3: Roll-out of the study in the remaining 17 Child Care Centres.***

#### **6.1.3.a. Pre-study implementation**

Prior to study implementation, the research team visited each CCC at a pre-arranged time to deliver study information sessions for all CCC staff. These sessions were usually undertaken during the CCC staff meeting times or tea breaks. Included in these sessions was information about the study and processes, timeframes, staff's involvement, and research team's requirements as already pre-arranged with the CCC Director (i.e. distribution and collection of consents and questionnaires, space to undertake child health measurements, and if required, revisits to maximise data collection from children that had been missed from the initial visit).

#### **6.1.3.b. Recruitment of families study information and consent process**

Families were recruited through consenting CCCs. The study inclusion criteria were parents and carers of:

- Children aged between 6 months and 4 years.
- Who have resided in Darwin or Palmerston for 12 months or more.
- Who do not have a medical condition requiring food or nutrition supplements.

Study packs detailing the study information, confidentiality and anonymity of participants, and consent were distributed to each Centre. A study pack was placed in each child's locker for the parent or carer to take home, read and complete the consent form (Appendix 6.7). Included in the study information pack were contacts for the study team if parents or carers required further information about the study and consent process. The research team were available in person at the Child care settings during times parents and carers dropped off and picked up their children. This provided an opportunity for parents and carers to learn more about the study and have any questions answered. Contact by telephone with the study team was only made by one parent where English was not a first language to explain the study.

#### **6.1.4. Phase 4: Data Collection**

The following were undertaken:

- Child health measurements: height or length, weight and haemoglobin levels;
- Family questionnaire containing the mUS 18-item Module, K10 and the Social Determinants survey; and

- In a sub-group, the test-retest of the mUS 18-item Module for repeatability was undertaken.

#### **6.1.4.a. Child Health Measurements**

Data was collected using standard methods for collecting anthropometric data in children (Davies et al. 2001). These standards were sourced from the measurement protocol as described by the World Health Organisation, WHO Expert Committee 1995.

Prior to the pre-arranged measurement day at the CCCs, parents/carers were advised to dress their children in light weight clothing. Due to time limitations and for children's comfort, no items of clothing were removed other than foot and head wear. Child health measurements were undertaken at the CCCs by the Study team (Appendix 6.5). During this stage of the study, additional Menzies School of Health Research Staff assisted with data collection (see Acknowledgements section).

Children's weights were taken using the Tanita Digital Stand on Scale for children able to stand unassisted and weight measured to the nearest 0.1kg. The Infant Tanita 1583 Digital scale was used for younger children and weight was measured to the nearest 2 decimal places. If a weight reading was difficult to obtain due to a child being restless, then a member of the research team would have their weight taken, then holding the child, have both weights taken together. The child's weight was then obtained by subtracting the study team member's weight from the combined weights. Only a single weight measurement was taken and recorded. If the initial weight reading taken was in doubt, then a second reading was taken and recorded.

Heights of children aged 2 years and above were taken using the Seca portable height measure (Stadiometer) and the measurement taken to the nearest 0.1cm. A Seca 210 baby length measuring mat, portable weight rubber with 10 – 99cm measuring range was used to measure children under 2 years of age. Two members of the study team were required to undertake this measurement, as one to ensure correct positioning of the child's head on the mat and the other to position the legs correctly and take the reading. Measurements were taken to the nearest 0.1cm. Similar to the weight measures, a single measurement was taken and recorded. A second was required if the initial measurement was in doubt.

The Masimo Radical-7 Signal Extraction Pulse Co-Oximeter (Masimo Corporation, Germany) and Masimo Radical-57 (Masimo Corporation, Germany) were used to measure haemoglobin levels non-invasively using a transcutaneous probe placed primarily on the child's index finger of their non-dominant hand. Readings were taken to the nearest 0.1 g/L. Two types of reusable sensors were used and dependent on the age of the child and size of their fingers. Children between the ages of 3 and 4 years were comfortable with the probe being placed on the finger. However, the probe was too large for younger children and a sensor that wrapped around the finger was used. To obtain a reading, it was necessary for the child to be still, have clean nails with no nail varnish for proper perfusion and have warm hands for good blood supply. If a child was restless, asleep or a reading was not able to be obtained from the hand, then the big toe was used. Normally, only one reading was required. However, similar to other child health measures if a measurement was in doubt then another was taken.

Data collection forms were used to record each child's height or length (age dependent), weight and haemoglobin level readings. At the end of the session, the study team completed a child health measurements feedback form for each child as a record for parents and carers to keep. If any haemoglobin level results were of concern ( $<110\text{g/L}$ ), included in the child health measurements feedback form was a suggestion the child visit their local doctor to re-check the result. My contact details were provided if the parent or carer had any queries. The child health results were included in the questionnaire packs and sent home. If there were more than one child per family involved in the study, only one questionnaire pack was sent home for completion.

#### **6.1.4.b. Questionnaires**

Similar to Stage 1 (Chapter 4) and the pilot process, information was collected through a questionnaire about household food security status, social determinants and levels of psychological distress. The tools used to collect data were the mUS 18-item Module, Social Determinants survey and the K10 Scale. Unlike Stage 1, the US 18-item Module was adjusted according to the Stage 2 findings, and included questions about strategies to cope with the experiences of food insecurity. In this instance, following the 18 questions of the US 18-item Module, three additional questions were included and developed from the Stage 2 Qualitative findings, (Chapter 5), to obtain information about reasons participants sought assistance and from where. Since a qualitative study was not included with the general population, it was important to know if participants who experienced food insecurity employed coping strategies and whether similar, or dissimilar, to the Indigenous Australian population.



Like the consent process, a timeframe for completion and return of the questionnaire was provided. The study team also requested that completed questionnaires be secured in the envelope provided and placed in the study questionnaire return box. The questionnaire return box was available near the parents' and carers' sign in and out register during operational hours and placed in the Directors locked office after hours. A member of the research team collected questionnaires at the end of each day.

#### **6.1.4.c. Test-retest of the mUS18-item Module**

A test-retest of the mUS 18-item Module was undertaken with a sub-group of 50 participants selected from a list of families who had previously completed the questionnaire across all 17 CCCs. It was pre-empted as these families had previously completed and returned the questionnaire, they would be more likely to participate in the subgroup. Consent to participate had already been obtained through the initial consent process. I contacted families according to contact details provided (telephone or email) with an invitation to participate and explain the test-retest process. It was made clear participation was voluntary and consent could be withdrawn at any time. The process involved contacting consented participants from all 17 CCCs until 3 participants from each CCC were secured, giving a total of 51 participants.

The process for undertaking the test-retest mUS 18-item Module was the same as that described for Stage 1 (Chapter 3). The Module was completed twice with a two week interval between each survey. Two options were offered to participants to complete the Module, firstly by email for self-administration or secondly by

telephone where I administered the questionnaire. Most participants preferred email. The survey was emailed to the participant and a date provided to have the completed questionnaire returned. Once returned, a receipt of survey was sent with a second survey and notification of completion date. A reminder email was sent a day prior to the due date if completed surveys had not already been returned. For participants who preferred to be telephoned, the participant was initially contacted to arrange a mutual date and time to complete the survey. I telephoned the participant, read the questions with participant providing a response to each question. I recorded the responses on the survey form and once completed, read back responses to the participant to confirm accuracy of recording. A date and time was then made with the participant to complete the second survey.

For email participants who did not return the survey by the due date, a reminder email was sent post 2 days of the return date. If no response, then another email was sent 4 days post return date with a follow-up phone call. If no response 6 days post return date, another email sent and phone call made. Failure to respond thereafter resulted in exclusion from the test-retest. Similarly, participants who chose the telephone option if unable to be contacted three times to undertake the initial or follow-up surveys, then excluded from the test-retest subgroup.

## **6.4 Data Management and Analyses**

### ***6.4.1a. Scoring of questionnaires***

To determine a household as food insecure or food secure, scores of  $\leq 2$  were categorised as food secure and scores between 3 and 18 as food insecure, as described in Chapter 3. Likewise, the Kessler 10 Psychological Distress Scale (range

10 to 50) was scored as described in Low (score 10 - 15), Moderate (score 16 - 21), High (score 22 - 29) and Very high (score 30 – 50) (Andrew and Slade 2001).

#### ***6.4.1b. Child Health outcome cut-offs for z-scores and haemoglobin***

The children's weight-for-age, weight-for-height and height-for-age z-scores were analysed using the WHO Anthro software (version 3.2.2, WHO 2010) and categorised as normal weight (-2 to +2 z-scores), overweight (> +2 z-scores) and underweight (<-2 z-scores). Haemoglobin was measured with Masimo Radical-7 Signal Extraction Pulse Co-Oximeter and Masimo Radical-57 and levels were assessed as low haemoglobin level < 110g/L and normal haemoglobin level  $\geq$  110g/L.

#### ***6.4.2. Analyses***

A Microsoft Access database specifically designed for this stage of the study was used to enter all data. Once data were entered, it was rechecked to ensure all information had been entered correctly. STATA 12 was used for data analyses with the assistance from a bio-statistician (Federica Barzi).

Secure and food insecure households were compared using chi square for categorical outcomes (Social Determinants Survey, Psychological Distress) and an unpaired T-test for continuous data (weight for age z-score, height for age z-score and haemoglobin) were used, after examination for normality of distribution. All child health data were included in a bivariate analysis and assessed against food security status, social determinants and K10. Logistic regression (using step-wise regression) was undertaken to account for possible confounding variables with food insecurity.

Variables entered into the model were ones with p values of  $<0.2$  in the univariate analyses.

Kappa Coefficient (Altman 1991) was used to determine the repeatability of the mUS 18-item module (test-retest). Repeatability was decided in how similar firstly, the two overall scores were for each module and the inter-reliability of the scoring categories (food secure, food insecure). Secondly, the repeatability for each of the 18-items was undertaken to determine same response rate between the test and retest of the m18-item Module.

## CHAPTER 7

### STAGE 3 FINDINGS

This Chapter presents the findings using the methods described in Chapter 6. The research questions addressed here are:

- 1. What are the influencing factors associated with food security status in families of children attend child care centres?*
- 2. How reliable is the modified mUS 18-item Module in measuring household food security status in families of children who attend child care centres?*
- 3. Does food security status have an impact on child health outcomes in children who attend child care centres?*

## **7.1 Description of demographics for carers of the children enrolled**

Two hundred and fifty-one children from 213 households were recruited from 17 child care centres. Twenty-six of the 213 households did not return questionnaires or questionnaires were partially completed (n=8) (i.e. mUS 18-item Module (n=4), Social Determinants survey (n=2) and two Kessler 10 scale (n=2)). All completed components of questionnaires were included in the data analyses. One household was later excluded during the preliminary analysis, as the child's age ( $\geq 5$  years) was outside the inclusion criteria.

The characteristics of the household are summarised in Table 7.1. The majority of participants were female non-Indigenous Australians. The median age was 36 years and the median household size was 4 individuals. Of the 186 participating households, 88% (164) were identified as food secure and 12% (22) as food insecure. A higher proportion of Aboriginal and Torres Strait Islander participants than non-Indigenous Australian participants reported household food insecurity (21% vs 11%) but this was not statistically significant. No participants responded 'yes' to arriving in Australia as a refugee (data not presented).

Table 7.1

Participant household characteristics and relationship with food security status, food secure (FS) and food insecure (FI)

Characteristic	FS N=164 (% of FS)	FI N=22 (% of FI)	Total cohort N=186 (%)	*p-values
Indigenous Australian status	Indigenous Australian 11 (6.7)	3 (13.6)	14 (7.5)	0.220
	Non-Indigenous Australian 153 (93.3)	19 (86.4)	172 (92.5)	
Born in Australia (N=185)	Yes 142 (86.7)	19 (86.4)	161 (87)	1.000
	No 21 (13)	3 (13.6)	24 (13)	
Primary carer (N=185)	Mother 155 (95)	18 (81.8)	173 (93.5)	0.018
	Father 8 (4.9)	3 (13.6)	11 (5.95)	
	Grandmother 0 (0)	1 (4.6)	1 (0.5)	
Primary Carer age in years	Median (Range) 36 (22-53)	37.6 (22.5-44)		0.8278
	Mean (SD) 35.7 (5.4)	35.4 (6.4)		0.79
People residing in house	Median (Range) 4 (2-8)	4 (2-6)		0.7133

\*p-value <0.05 statistically significant

## **7.2 Examination of factors that influence food security status**

Presented within this section are the study's findings of factors that influence food security status. The factors investigated were social determinants which include household infrastructure, transport, proximity to food outlets, education attainment and income levels as well as estimated proportion of household income spent on food. Psychological distress, as a factor potentially related to food security status was also investigated through use of the Kessler 10 Psychological Distress Scale. Reasons for seeking assistance when experiencing food insecurity and coping strategies used were included within the findings of this section.

Table 7.2.1 lists food access and household infrastructure characteristics with respect to household food security status. From the results, it appears that there are differing experiences between the food secure and food insecure groups with household income level and transport. Most participants reported to have access to a supermarket although those who were food secure were more likely to report to having a choice of 'where to shop'. Similarly, nearly all participants had use of private vehicles (car). Although, the food insecure group were more likely to report use of public transport than the food secure group. Of interest, the functional kitchen results indicated that all (100%) food insecure participants had a working fridge, stove, kitchen benches and cupboards.

Table 7.2.2 presents the findings for employment status, income level and educational attainment in relation to food security status. There was no significant difference in income level and food security status.



### 7.2.1 Food access and household infrastructure

**Table 7.2.1 Relationship between food access and household infrastructure characteristics with food security status**

	Characteristic	FS N=164 (%)	FI N=22 (%)	N=186 (%)	*P-values
<b>Functional kitchen (positive responses)</b>	Fridge (N=185)	163 (100)	22 (100)	185 (100)	1.000
	Stove (N=185)	163 (100)	22 (100)	185 (100)	1.000
	Kitchen cupboards (N=185)	159 (97.5)	21 (95.5)	180 (97.3)	0.473
	Kitchen benches (N=184)	161 (99.4)	22 (100)	183 (99.5)	1.000
<b>Food outlet accessed (positive responses)</b>	Supermarket (N=184)	162 (100)	22 (100)	184 (100)	1.000
	Corner Store (N=183)	36 (22)	3(14.3)	39 (21.3)	0.574
	Specialty Store (butcher, bakery, seafood, fruit &veg)	97 (59.2)	11 (50)	108 (58)	0.492
	Takeaway (N=184)	33(20)	7 (32)	40 (22)	0.269
	Other (online, wholesalers and farms) (N=184)	9 (5.5)	2 (9.1)	11(6)	0.622
	Food markets (N=182)	55 (34.2)	4 (19)	59 (28.5)	0.218
<b>Reason shop at these places</b>	Where want to shop (N=184)	158 (96.4)	16 (72.7)	174 (94.6)	p<0.0001
	Transport problems (N=177)	2 (1.3)	1 (5)	3 (1.7)	0.304
<b>Transport type used</b>	Public (bus and taxi)	4 (2.4)	3 (13.6)	7 (4)	0.037
	Private (car) (N=185)	160 (98)	21 (95)	181 (97.8)	0.400
	Other (motor bike, bicycle and walk)	47 (29)	6 (27.3)	53 (28.5)	1.000

\*p-value <0.05 statistically significant

## 7.2.2 Social Determinants

**Table 7.2.2 Social Determinants characteristics and relationship with Food Security status**

	Characteristic	FS N=164 (% of FS)	FI N=22 (% of FI)	Total Cohort N=186 (%)	*P-values
<b>Employment status</b>	Working (Full-time, Part-time and Casual)	145 (88)	18 (82)	163 (88)	0.49
	Other (home duties, studying full-time, retired)	19 (12.0)	4 (18)	23 (12)	
<b>Highest Education attainment level</b>	No formal education	1 (0.61)	0	1 (0.5)	0.176
	Secondary	24 (15)	7 (32)	31 (17)	
	^Post secondary	138 (85)	15 (68)	153 (82.7)	
<b>Fortnightly Net Income (N=161)</b>	\$0 – 1,999.00	29 (18)	7 (32.0)	36 (19.4)	0.16
	\$2,000 and above	130 (82)	15 (68)	145 (78)	
<b>Income source 1 (N=184)</b>	Wages	156 (96)	20 (91)	176 (96)	0.245
	Government benefits or Profit and Loss	6 (3.7)	2 (9.1)	8 (4.4)	
<b>Income source 2 (N=20)</b>	Government benefits	11 (6.1)	2 (9.1)	13 (65)	0.724
	Profit or loss	3 (1.8)	0	2 (10)	
	Other (rental property income, savings)	3 (1.8)	1 (4.5)	4 (20)	
<b>Proportion of income spent on food</b>	Quarter or less	110 (68)	14 (64)	124 (67.8)	0.636
	At least half	51 (31.7)	8 (36.4)	60 (32.8)	
	More than half	0	0	0	

\*p-value <0.05 statistically significant. ^ Certificate/Diploma 40.4%, Undergrad 40.4% and Postgrad 19.2%

### 7.2.3 Psychological distress and wellbeing

#### 7.2.3a Kessler 10 (K10) Psychological Distress Scale

Described within this section, are the psychological distress findings obtained through the Kessler 10 Psychological Distress Scale (K10). Of the whole cohort, the majority of participants (77.4%) reported low levels of psychological distress within the past four weeks from the survey date. As presented in Table 7.2.3a, there were significant differences in psychological distress between the food secure and food insecure groups ( $p=0.002$ ). The food insecure group tended to report high to very high levels of psychological distress when compared with the food secure group, 18.2% vs 2.5% and 4.6% vs 0% respectively.

**Table 7.2.3a**

#### **Kessler 10 (K10) Score categories and relationship with food security status**

<b>K10 Score</b>	<b>FS N=162</b>	<b>FI N=22</b>	<b>Total</b>	<b>*P-value</b>
	<b>(% of FS)</b>	<b>(% of FI)</b>	<b>N= 184 (%)</b>	
10 – 15 (Low)	129 (79.6)	13 (59.1)	142 (77.2)	0.002
16 – 21 (Moderate)	29 (17.9)	4 (18.2)	33 (17.9)	
22 – 29 (High)	4 (2.5)	4 (18.2)	8 (4.4)	
30 – 50 (Very high)	0	1 (4.6)	1 (0.5)	

\*p-value <0.05 statistically significant

### **7.2.3b Kessler 10 (K10) Psychological Distress Scale and selected characteristics**

Table 7.2.3b examined the relationship between key social determinants in the cohort grouped by K10 categories. Those in the high to very high K10 scoring group had significantly lower income levels, lower education attainment and were more likely to use public transport.

**Table 7.2.3b**

**Comparison of key social determinant characteristics in the cohort grouped by K10 scoring categories**

Characteristic		K10 (Low and moderate scores) N=175 (%)	K10 (High and very high scores) N=9 (%)	Total cohort N=184 (%)	*P value
Primary Carer	Mother	164 (94.0)	8 (89.0)	172 (93.5)	0.463
	Other (Father and Grandmother)	11 (6.0)	1 (11.1)	12 (6.5)	
Income	\$0 – 1,999	30 (17.0)	6 (66.7)	36 (19.9)	0.002
	\$2,000 and above	142 (83.0)	3 (33.3)	145 (80.1)	
Education attainment	No formal education	0	1 (11.1)	1 (0.54)	0.007
	Secondary	28 (16.0)	3 (33.3)	31 (16.85)	
	^Postsecondary	147 (84.0)	5 (55.6)	152 (82.6)	
Employment status	Working	156 (89.14)	6 (66.7)	162 (88.0)	0.078
	Other	19 (10.9)	3 (33.3)	22 (12.0)	
Reasons shop	Where want to shop	165 (94.8)	8 (88.9)	173 (94.5)	0.404
	Transport problems	9 (5.2)	1 (11.1)	10 (5.5)	
Transport	Public	5 (2.9)	2 (22.2)	7 (3.8)	0.039
	Private	173 (98.9)	7 (77.8)	180 (97.8)	0.012
	Other	48 (27.4)	4 (44.4)	52 (28.3)	0.274

\*p-value <0.05 statistically significant. ^ Certificate/Diploma 40.4%, Undergrad 40.4% and Postgrad 19.2%

### 7.2.4 Assistance sought to alleviate food insecurity

Participants answered three additional questions if they answered ‘yes’ to either question 1 or 2 of the mUS 18-item Module. Of the 22 participants identified as food insecure, twelve (54.5%) answered the additional questions on food assistance. The remaining 55.5% chose not to respond to these questions. Table 7.2.4 outlines participants’ responses. The main reason for seeking assistance was ‘expenses to be paid’. Of those who provided a response, most reported to not seek assistance. Four participants responded to seeking assistance from almost every month to once or twice a year.

**Table 7.2.4**

#### **Characteristics of reasons seeking assistance and coping mechanism used**

<b>Question</b>		<b>Characteristic</b>	<b>N=12 (%)</b>
<b>21</b>	<b>*Reason for seeking assistance</b>	Expenses to be paid (bills)	10 (83)
		Not enough money	2 (16.7)
		Other	6 (50)
		(no money after pay bills, fresh fruit too expensive)	
<b>22</b>	<b>From where assistance sought</b>	Family	1 (8.3)
		No assistance required	4 (44.3)
		Other (hawked jewellery (1); survived (1); adult gave up meals (1)	3 (25)
		Missing	4 (33.3)
<b>23</b>	<b>How often assistance sought in past year</b>	Almost every month	1 (8.3)
		Some months	1 (8.3)
		One or two months	2 (16.7)
		Don’t know	3 (25)
		Missing	5 (42)

\*More than one response provided

### **7.3 Logistic Regression analysis**

The findings outlined in sections 7.1 and 7.2, showed the relationships between food security status, psychological distress (K10) and selected social determinants characteristics found to be associated in the bivariate analysis. Therefore, a logistic regression was performed to determine the strength of factors associated with food security status (dependent variable) and selected potential confounding variables (i.e., demographic and social determinant characteristics).

The results as shown in Table 7.3.1 indicate that the significant independent factors that were associated with food security status were: psychological distress (defined on K10 scores), 'where want to shop' and use of 'public transport'. Those who scored higher on the K10 were 11.6 times more likely to be food insecure compared to those who scored lower. Similarly, food access was an important factor associated with food security status; participants were 14.8 times more likely to be food insecure if they were unable to shop where they wanted to shop. Likewise, those who reported to use public transport were 6.6 times more likely to be food insecure. The confidence intervals were very wide which reflects the small sample size and/or the presence of other factors unaccounted for.

**Table 7.3.1****Food insecurity and associated factors**

<b>Variable</b>	<b>Odds Ratio</b>	<b>SE</b>	<b>*P-value</b>	<b>CI (95%)</b>
K10 total	11.6	8.3	0.001	2.8 – 47.4
Primary Carer Father	3.2	2.3	0.104	0.78 – 13.3
Where want to shop	14.8	10.3	p<0.0001	3.7 – 58.0
Public transport	6.6	5.3	0.019	1.4 – 31.8
Education attainment	0.5	0.2	0.131	0.22 – 1.21
Income	0.5	0.24	0.14	0.18 – 1.3

\*p-value <0.05 statistically significant

**7.4 Test – Retest of the mUS 18-item Module**

As this tool has not been used previously (other than with the Aboriginal and Torres Strait Islander population described in Chapter 4) within the study's population, a test-retest was undertaken to determine the repeatability of the tool and was administered twice within a two-week timeframe.

Forty-eight participants completed the test-retest and Table 7.4.1 presents the demographics of participants. All participants were mothers, most were non-Indigenous Australian (94%) and with children aged between 25 and 48 months. As described in Table 7.4.2, of the 48 participants 47 were food secure and one food insecure.



**Table 7.4.1****Demographics of mUS 18-item Household Module Test-Retest Group**

<b>Demographic Characteristic</b>		<b>Total group N=48 (%)</b>
<b>Indigenous Australian Status</b>	Indigenous	3 (6)
	Non-Indigenous	45 (94)
<b>Gender</b>	Male	0
	Female	48 (100)
<b>Primary carer</b>	Mother	48 (100)
	Father	0
	Other (Grandmother and	0
	Carer)	
<b>Age of primary carer, years</b>	Median (range)	35 (25 – 49)
<b>Number people in house</b>	Median (range)	4 (2 – 7)
<b>Number of children per age group (months) N=56</b>	6 – 24	18
	25 – 48	38

**Table 7.4.2****Test – Retest of mUS 18-item Module by food security status**

<b>Food Security Status</b>	<b>Test-Retest</b>		<b>Total</b>
	<b>Test 1</b>	<b>Test 2</b>	
<b>Food Secure</b>	47	47	94
<b>Food Insecure</b>	1	1	2
<b>Total</b>	48	48	96

Outcomes of the test-retest for each of the 18 items and the total food security score are presented in Table 7.4.3. Kappa analysis indicated that there was excellent agreement with the total score for the 18 questions. Agreement was less for individual questions.

Four participants did not answer the same for question 1 and two participants did not respond the same for question 2 between the first and second administration of the mUS 18-item Module. No respondents answered question 17 and therefore, no data is presented. Similarly, for question 6 the kappa analysis could not be performed due to insufficient data (1 participant only). Questions 15 and 18 could not be analysed as Kappa analysis requires data population in a 2 x 2 table arrangement. If data cells are unpopulated, then Kappa analysis cannot be performed.

**Table 7.4.3**

**Kappa Coefficient analysis for test-retest of mUS 18-item Module by question**

<b>Question number (brief description of question)</b>	<b>Answered same N=48 (%)</b>	<b>Kappa score (95% CI)</b>
1 (worried food run out, can't buy more)	46 (96)	0.65 (0.38-0.91)
2 (food didn't last)	48 (100)	1 (0.72-1.28)
3 (can't afford healthy food at each meal)	48 (100)	1 (0.72-1.28)
4 (relied on low cost food)	47 (98)	0.90 (0.62-1.18)
5 (Adults reduce meal size)	48 (100)	1 (0.72-1.28)
*6 (Occurrence of adults reducing meal size)	1 (100)	^Insufficient data
7 (Can't afford healthy food each meal for children)	48 (100)	1 (0.72-1.28)
8 (Adults eat less)	48 (100)	1 (0.72-1.28)
9 (Children not eating enough food)	48 (100)	0.52 (0.18-0.85)
10 (Adults go hungry)	48 (100)	1 (0.72-1.28)
11 (Adults lose weight)	48 (100)	1 (0.72-1.28)
12 (Children's meal size reduced)	48 (100)	0.780 (0.40-1.15)

13 (Adults not eat for whole day)	48 (100)	1 (0.72-1.28)
*14 (Occurrence of adults not eating for whole day)	1 (100)	^Insufficient data
15 (Children go hungry)	48 (100)	Too few cells
16 (Children miss meals)	48 (100)	0.65 (0.29-1.01)
*17 (Occurrence of children missing meals)	No data	No data
18 (Children not eat for whole day)	48 (100)	Too few cells
Total food security score	48 (100)	1 (0.72 – 1.28)

\*Denotes questions responded to if the previous corresponding question was responded to as ‘yes’. ^Limited data obtained from two of the three asterixed questions, resulted in inability to perform the Kappa statistical analysis for these questions.

## **7.5 Child Health Data**

### **7.5.1 Relating child health data to food security**

Not all child health measures could be collected in every child. Therefore, of the 251 children, only 195 children had complete data for haemoglobin, height/ length and weight measurements collected and questionnaire data. An overview of the children's demographic and health measurements with food security status is provided in Table 7.5.1.

As previously reported in section 7.1, not all households returned the mUS 18-item Module and one child was illegible for the study. Therefore, analysis of child health data and food security status were based on the 186 households with both child health data and food security status information. It is important to note, when interpreting the data in Tables 7.3.1, 7.3.2 and 7.3.3, some households had multiple children per household eligible to participate in the study. Therefore, the total numbers for food secure and food insecure is reflective of the number of children participating from each household. There were no significant differences in gender, age, or haemoglobin status between the groups classified by food security status.

Table 7.5.1

## Child demographic, haemoglobin level and household food security status

Child Demographic and Health measurement	FS N=173 (%)	FI N=22 (%)	N = 195(%)	*P value
<b>Gender</b>				
Male	88 (50.9)	14 (63.6)	102 (52.3)	0.26
Female	85 (49.1)	8 (36.4)	93 (47.7)	
<b>Age group (months)</b>				
6 – 24	34 (19.6)	5 (22.7)	39 (20.0)	0.734
25 – 48	139 (80.3)	17 (77.3)	156 (80.0)	
<b>Haemoglobin (g/L)</b>				
< 110g/L	45 (26.0)	2 (9.1)	47 (24.1)	0.081
≥110g/L	128 (74.0)	20 (90.9)	148 (75.9)	
Median	11.5	11.6		
(range)	(8.1-15.4)	(9.9-14.7)		
Mean (SD)	11.7 (1.3)	11.8 (1.05)		

\*p-value &lt;0.05 statistically significant

### **7.5.2 Child health measurements (mean z-scores) by age group and household food security status.**

Combined mean z-scores for boys and girls by weight-for-age, height/length-for-age and weight-for-height by age groups are presented in Table 7.5.2. There were no significant differences between the Food Secure and Food Insecure groups.

### **7.5.3 Weight-for-age z-scores for all children by food security status**

The age groups of the cohort were combined and shown in Table 7.5.3 is that most children's (86%) weights were within the normal weight range (between -2 and +2 z-scores) and 14% of children were overweight (> +2 z-scores). Children in food secure households were significantly more likely to have their weight within the normal range than children in food insecure households ( $p=0.018$ ), who were more likely to be overweight.

Table 7.5.2

## Presentation of z-scores for boys and girls by age group and food security status

Mean z-score for weight-for-age of both girls and boys							
Age group (months)	FS N=171			FI N=21			*P value
	Number	Mean	SD	Number	Mean	SD	
6 – 24	32	0.80	1.22	5	1.06	0.91	0.65
25 - 48	139	0.32	0.80	16	0.68	1.23	0.10
Mean z-score for height/ length-for-age of both girls and boys							
Age group (months)	FS N=171			FI N=21			*P value
	Number	Mean	SD	Number	Mean	SD	
6 – 24	32	-0.13	1.52	5	0.78	0.98	0.21
25-48	139	0.12	0.98	16	0.45	1.43	0.23
Mean z-score for weight-for-height of both girls and boys							
Age group (months)	FS N=183			FI N=24			*P value
	Number	Mean	SD	Number	Mean	SD	
6 – 24	32	1.17	1.22	5	0.9	1.43	0.66
25 – 48	139	0.34	0.97	16	0.61	1.19	0.31

\*p-value &lt;0.05 statistically significant



**Table 7.5.3**

**Weight-for-age z-score for all children by food security status**

Weight-for-age z-score category	FS N=171		FI N=21		*P-value
	Number	Percent	Number	Percent	
Normal weight-for-age (-2 to +2 z-scores)	168	98	18	86	<b>0.018</b>
High weight-for-age (>+2 z-score)	3	2	3	14	
Low weight-for-age (<-2 z-score)	0	0	0	0	
Median z-score		0.40		0.77	0.16

\*p-value <0.05 statistically significant

## **7.6. Discussion**

### ***7.6.1 Summary and discussion of key findings***

Through the use of the mUS 18-item Module in this cross sectional study with complete data on 186 households, 88% of households reported to be food secure and 12% food insecure. Food security status was statistically significantly related to: choice of where to shop; use of public transport; level of psychological distress and child weight. Food security status was not significantly associated with: declared income; household food storage, preparation and cooking facilities; or the child's age, gender or haemoglobin status. Lastly, the test-retest results of the mUS 18-item Module, showed excellent agreement in repeatability of the measure within the two-week timeframe.

### **7.6.2 Comparison of the prevalence of reported food security**

The 12% prevalence of food insecurity in the study sample was higher than that reported by the Australian National Health Survey (ABS 2015) of 4.0% nationally and 4.7% for the Northern Territory. Other similar Australian studies, though with a focus in low socio-demographic populations, have also found a higher prevalence of food insecurity being 21.9% (Nolan et al. 2006) in a study sample of 4,239 low socio-demographic households in Sydney, New South Wales and 34% (Ramsey et al. 2011) in a study undertaken with 185 low socio-demographic households in Brisbane, Queensland.

### **7.6.3 Factors associated with food security status**

In my study, although food security status was not found to be associated with measures of socio-economic status and all participants reported having use of a private car and access to a supermarket, public transport use was significantly associated with food security status. The importance of improving transportation to access supermarkets was previously reported by Nolan et al. (2006) as a health promotion strategy identified by the food insecure. Studies undertaken within the United States have identified a relationship between limited access to a private car and restricted access to larger grocery stores (supermarkets). In these instances, participants tended to access food outlets within close proximity to their residence and the food prices in these stores were more expensive (Stevens 2010; De Marco et al. 2009; Clifton 2004; Martin et al. 2004) than in the larger supermarkets.

Household food storage, preparation and cooking facilities were in good working order and did not appear to be any different between the food secure and food insecure groups. Hamelin et al.'s (2008) and Stevens' (2010) studies have explored the availability of structured programs for the food insecure with the aim to promote food security through skill development, such as cooking, budgeting and nutrition promotion. However, no other food security related studies that I am aware of have enquired about the functionality of household food preparation, storage and cooking facilities, which forms part of food access as identified by Rychetnik et al. (2003) and detailed earlier in this thesis (chapter 1, Figure 1.1 Determinants of Food Security Model).

As noted in Chapter 4, Torzillo et al. (2008) conducted an initial assessment on Aboriginal and Torres Strait Islander houses across Western Australia, Northern Territory, Queensland, New South Wales and South Australia. With relevance to my study, findings for improving nutrition, one of nine principles for health housing, only 6% of households met the criteria for improving nutrition through functional nutrition hardware (Torzillo et al., 2008). Similarly, Bailie and Runcie (2001) found household infrastructure most frequently identified as not functional or not present (kitchen bench 26%, stove top 41% and oven 42%). Only 42% of households were identified as having a functioning refrigerator. Both studies have relevance to mine, although there are differences in the study populations, as functional hardware within the home for improving nutrition is essentially an enabler for food security.

In my cohort, no significant associations of differences in employment status, income level and level of education attainment between the food secure and insecure groups were identified. This finding is in contrast to other studies where food insecurity has been shown to exist in vulnerable groups with young children, where the primary carers are usually mothers who are unemployed (Ramsey et al. 2011) or underemployed with a low-income and education attainment (Stevens 2010; Quandt et al. 2006; Kaiser et al. 2007; Kaiser et al. 2003). Other food security focussed studies, some not specifically in families with young children, have also identified under or unemployment, low income (Markwick et al. 2014) and low education attainment as associated with food insecurity (Radimer et al. 1997; Nolan et al. 2006; Anater et al. 2011; Hamelin et al. 2002; Martin et al. 2003; De Marco et al. 2009; Foley et al. 2009; Ramsey et al. 2011).

Possible explanations for why my study's findings were dissimilar include the small sample size of food insecure households (n=22). Twenty-three participants reported non-working and were undertaking home duties, studying full-time or retired. There are factors that have not been considered in my study that may also be important proxies of socio-economic status. For instance, information about marital status and housing tenure (home ownership vs. renting) were not requested in my study. Self-administration of the questionnaire may have also influenced reporting of information.

One of the most notable findings in my study is the association between food security and the psychological distress status of carers measured on K10 and use of public transport. Most study participants reported moderate to low levels of psychological distress. Participants who reported higher levels of psychological distress were more likely to be food insecure, have lower income, lower levels of education attainment and reported higher use of public transport. Other studies have reported on psychological distress and wellbeing levels in relation to socio-demographic factors and food insecurity in various populations (Temple 2008; Temple 2006; Tarasuk 2001; Casey et al. 2006; Casey et al. 2004; Vozoris and Tarasuk 2002; Kaiser et al. 2004; Huddleston-Casas et al. 2008; Siefert et al. 2001; Stuff et al. 2004; Carter et al. 2011). Associations with psychological distress and wellbeing levels and food insecurity have been shown for those with a low income (Huddleston-Casas et al. 2008; Carter et al. 2011; Vozoris and Tarasuk 2003; Seifert et al. 2001; Kaiser et al. 2007; Stuff et al. 2004; Casey et al. 2006) and low education attainment (Huddleston-Casas et al. 2008; Carter et al. 2011, Siefert et al. 2001; Kaiser et al. 2007; Casey et al. 2006).

#### **7.6.4 Relating food security status to children's health parameters**

The selected child health measures used in my study were growth parameters (haemoglobin and weight and height for age z-score), as these have importance in overall health outcomes and have also been used in previous studies on food security (Ramsey et al. 2011; Bhattacharya et al. 2004; Oh and Hong 2003; Casey et al. 2008; Brotanek et al. 2007; Skalicky et al. 2006; Egeland et al. 2010). My study found no significant difference in haemoglobin levels, height-for-age and weight-for-height z-scores between the food secure and food insecure groups. However, the food insecure group had a significantly higher proportion of children in the overweight group (weight-for-age of  $> +2$  z-score) when compared with the food secure group ( $p=0.018$ ). Although the data was significant between groups, the small numbers require that interpretation of these data occur with caution.

Nevertheless, studies undertaken in other similar populations have also reported the phenomenon of food insecurity and the relationship with a higher proportion of children being in the overweight category ( $> 2$  z-score) (Oh and Hong 2003; Bhattacharya et al. 2004; Casey et al. 2001 and Egeland et al. 2009). Of these studies, two examined the relationship between food insecurity, overweight-obesity and dietary intake in children (Oh and Hong 2003; Bhattacharya et al. 2004). The study by Oh and Hong (2003) was undertaken in a sample of 370 children aged 4-12 years old from low-income Korean urban families and found the mildly food insecure children were heavier (31%) than the food secure children (16%) and consumed cheaper foods high in fat or sugar. Bhattacharya et al. (2004) reanalysed data from the National health and Nutrition Examination Survey III, a US dataset.

Dietary information was analysed according to the United States Department of Agriculture (USDA) Healthy Eating Index (HEI) and used to assess dietary recall data. The HEI has 10 components and each component is scored 0 (unhealthy diet) – 10 (healthy diet). R-squared goodness of fit model was used for regression analysis and findings specific to children aged 2 – 5 years (n=4248) were that children in poverty were less likely to have healthy diets and more likely to be overweight when compared with children not in poverty. Diet quality and food insecurity among children has also been identified by Skalicky et al. (2006) and found of children aged 6 months to 3 years (N=626) participating in a US Children's Sentinel Nutrition Assessment Program (C-SNAP), 10.4% were food insecure and 7.8% of these children experienced reduced diet quality. Also to note, associations with child overweight-obesity were not reported as these were not within the study scope.

Collecting children's dietary information was not within the scope of my study. However, as noted in relevant studies, significant findings have been found with a relationship between food insecurity, child overweight-obesity and dietary intake. Possible reasons for this phenomenon are higher energy dense diets among the food insecure and the affordability of these dietary foods due to their relatively lower cost (Stevens 2010; Ricciuto and Tarasuk 2006; Chan et al. 2006; Drewnowski and Darmon 2005). The findings reported here, as confirmed by other studies, suggests that another possible underlying reason may be restricted access to larger supermarkets where there is more of a variety of food at better prices (Stevens 2010; De Marco et al. 2009; Nolan et al. 2006; Clifton 2004). However, this last point is not likely within my study, as findings showed all participants had access to a supermarket.

My study's findings of child haemoglobin levels and food insecurity is in contrast to other studies where reported are higher iron deficiency and iron deficiency anaemia rates in food insecure children (Brotanek et al. 2007; Skalicky et al. 2006). However, the sampling frame of my study was different to those aforementioned, as I recruited through child care centres whereas, the Skalicky (et al. 2006) and Brotanek (et al. 2007) studies were undertaken in known food insecure populations registered with formal assistance programs. Secondly, the method of obtaining haemoglobin readings differed, where venepuncture blood samples were used in these two studies and I used a non-invasive technique using an oximeter with a Haemoglobin reading probe (SpHb). This validated (Fearon 2011; Renner 2010) new technique was used as it was considered more acceptable and feasible.

As described earlier in this section, Skalicky et al.'s (2006) study was undertaken with children aged 6 months to 3 years and carers who participate in C-SNAP. Within this sample, most children were food secure (89.6%) and 10.4% were food insecure. Among the food insecure children, 21% were anaemic, but not iron deficient, 7% iron deficient with no anaemia and 11% had iron deficiency anaemia. Also reported were that food insecure children were 2.4 times more likely to have iron deficiency anaemia than the food secure. Brotanek et al. (2007) examined risk factors for iron deficiency anaemia in US children aged 1 – 3 years, using National Health and Nutrition Examination Survey (NHANES) IV (1999 to 2002) data. Findings showed, 12% of toddlers in food insecure households had iron deficiency compared with 7% in food secure households ( $p=0.06$ ) and iron deficiency was more prevalent among overweight children (20%) when compared with those at risk for overweight (8%) and 7% for normal weight toddlers ( $p=0.02$ ) (Brotanek et al. 2007).



To further add, of relevance to my study, Brotanek et al. (2007) conducted a multivariate analysis and found toddlers not in day care were 1.9 times at higher risk of being iron deficient and toddlers who were overweight were 3.4 times at higher risk of being iron deficient. Therefore, toddlers who were overweight and not in day care were at higher risk of iron deficiency.

#### **7.6.5 Repeatability of the mUS 18-item Module in cohort**

The test-retest of the mUS 18-item Module to determine the repeatability of the tool in this population using Kappa analysis showed excellent repeatability. This is one of the first endeavours we are aware of to test the reliability of the 18-item module within an Australian population. Ramsey and colleagues (2011) used the US 16-item module within a low socio-demographic population and measured the internal consistency (scale reliability) of the scale and yielded a Cronbach's alpha of 0.90. Therefore, indicating internal consistency of the scale in the study population (Ramsey et al. 2011).

As noted, there was excellent repeatability of the tool with the overall scores in my study. However, the first question 'worried food would run out and can't buy more' performed moderately (Kappa 0.65). Other population based studies where the US 18-item module has been adapted and tested, and shown to be reliable are that of Rafiei et al. (2009), Bezuneh et al. (2008), Gulliford et al. (2006) and Derrikson et al. (2000). However, these studies did not report on the Kappa coefficient of their adapted tool and as noted in the methodology chapter (chapter 6) which is considered the current standard for measuring test-retest (Altman 1991). Instead, the Rasch

statistical Model method was used, as this was also the preferred statistical model to assess each scale item in the development of the current US 18-item Module (Bickel 2000).

In populations where the US 18-item module has been adapted and tested, certain scale items have not performed according to the Rasch model. For instance, Bezuneh et al.'s (2008) study within a Dominican Republic population noted that question 11 (adult lost weight) and question 7 (children not eating enough) were problematic. Gulliford and colleagues (2006) validated the US 18-item Module within a multiethnic Caribbean population and found the module performed well, however, the 'balanced meal' item performed moderately of which a lower discrimination boundary was provided compared with other items. Though, Gulliford et al. (2006) concluded the items generally performed in a very similar manner to that of United States Current Population Survey Food Security (US CPS-FSS). They concluded the measure was capable in distinguishing between moderate and severe hunger, and allowed food security status of adults and children to be estimated separately (Gulliford et al. 2006). Rafiei and colleagues (2009) adapted the US 18-item Module and assessed the internal validity with adults and children in Iran. Findings indicated that the overall fit of data to the Rasch model was similar to that of US CPS-FSS. Rafiei et al. (2009) concluded that the adapted US 18-item Module is an internally valid household level measure of food insecurity among adults and children in the Iranian setting as the distribution of items across a considerable range of severity of food insecurity, along with acceptable item-fit statistics, indicated high average item discrimination and a good fit to the Rasch statistical measurement model.

In light of what was discussed in Chapter 4, the test-retest findings from my initial small cohort (section 4.5) indicated fair agreement and therefore, not repeatable. This is in contrast to the test-retest findings noted in this chapter where there was excellent agreement. A possible reason for the discrepancies between the two populations for the outcomes of the mUS 18-item Module test-retest is that the reporting period of 12 months may pose difficulty in recalling responses to questions for the Indigenous Australian population, unless food insecurity is experienced at regular intervals. Bickel (2000) also noted potential issues for misreporting over a 12 month period and demonstrated that a 3 month timeframe was a reliable reporting period. Noted in the Stage 1 methods chapter (Chapter 3), the mUS 18-item Module was focus tested with Aboriginal health professionals to determine understanding of terminology and questions. The recommended adjustments to the mUS 18-item Module were terminology, reframing statements as questions and reporting as either yes or no responses. However, there is potential for the study population to misunderstand some of the terminology used, even after the recommended adjustments were made. Therefore, cognitive testing the questions, particularly the first question of the mUS 18-item Module, should be considered in a future study to: firstly, understand terminology used and question comprehension and secondly, test the applicability of the US 18-item module questions within the Australian context. Cognitive testing of questions was also noted by Bezuneh et al.'s (2008) study when items did not perform as expected.

## **7.7 Strengths, Limitations and Implications**

### ***7.7.1 Strengths***

This study is one of a few studies that have used the US 18-item Module within an Australian population. Nolan et al. (2006) and Ramsey et al. (2011) have used the US 16-item Module to assess food insecurity within Australia. To my knowledge, this is the first time a study has investigated household food security status and its determinants within an urban Australian population in Northern Australia. A majority of studies with relevance to my research have been undertaken in identified food insecure populations within the United States and Canada, where participant recruitment has been undertaken through food assistance programs. Similar food security studies to mine where participant sampling is from within the general population are few. Within the limited Australian food security research context, most research targeting food security is population based and not specific to families with young children. Other aspects of interest found in my study are the relationships with household food insecurity and psychological distress levels of the primary carer. This has not been investigated previously within an Australian context and adds to the knowledge of understanding the complexity food insecurity experiences. Therefore, this study provides new knowledge to the literature and insight into Australian families' food security experiences.

The results of the test-retest of the mUS 18-item Module provides an opportunity to further explore the future use of this tool within Australia to assess not only the prevalence of food insecurity, but as an assessment and monitoring tool for policy and programs at the national, state and regional levels.

### **7.7.2 Limitations**

However, there are also limitations to this study's findings that may have potentially, underestimated, or overestimated, the level of food insecurity or food security within the target population. Recruitment was undertaken through long day child care centres where children receive nutritious meals during the week days. The child health results as being indistinguishable between the food secure and food insecure may have been biased due to sampling through this avenue. The sample size comprising of 186 households and 213 children could be considered quite large for this population. However, recruitment sampling strategy through the child care centres may bias the findings and results should only apply to child care centre settings.

The mUS 18-item module is a modified version of the US Department of Agriculture 18-item household food security module scale and using the criteria to assess food security status and levels of food insecurity experienced. Severity in levels of food insecurity was not analysed for this study population, nor was it a focus. However, severity in levels of food insecurity has potential to further inform interpretation of child health outcome measures and levels of psychological distress as measured and categorised using the K-10 psychological distress scale. Therefore, when considering future similar research, requirements in larger sample sizes or a multi-site study would provide the robustness in performing such analyses in assessing severity of food insecurity against levels of psychological distress and child health outcome measures.

### ***7.7.3 Implications for policy, practice and further research***

The results from my study indicate that household food insecurity is a real experience for some families within the study sample and is possibly related to K10 psychological distress levels, the ability to choose where want to shop and use of public transport. Given the relationship between food insecurity and psychological distress, policy and programs addressing wellbeing issues in carers of young children would benefit from program users being assessed for food insecurity as part of their care. Access to outlets with reasonably priced quality food needs to be considered within town planning policy as enablers for an affordable nutritious diet that is essential for overall health and wellbeing. Given overweight and obesity are risk factors associated with the increasing problem of chronic disease, such as Type 2 Diabetes, in Australia, providing access to affordable quality food should be considered an essential preventative public health measure.

It is important to note, this study is a snapshot of the study population and further similar research is required. Firstly, a broader representative sample should be considered for more conclusive evidence with the prevalence of food insecurity within this Australian population as well as the enablers and barriers of food security. Secondly, testing the repeatability of the mUS 18-item Module in a larger sample may potentially reinforce the appropriateness of use within the Australian context to measure prevalence of food insecurity and severity. Using the mUS 18-item Module within the study population was useful in understanding the level of food insecurity experienced. Undertaking a further study where the mUS 18-item module is used within a larger sample and comparing with national data as collected through the ABS, has potential to show the benefit of the mUS 18-item Module for use with the

broader Australian population and have a level of sensitivity to provide information of the severity level of food insecurity experienced. Having such information could be useful in comparing demographic regions within Australia and provide evidence in allocating resourcing against level of need. Government policy could also provide a broader framework for a focus on enablers to food security, including equitable programs for low-socioeconomic areas that are inclusive of financial subsidies that enable accessibility, affordability and availability of nutritious food. Having regular and ongoing national household food security data collected, would also provide scope to compare data with other countries where the US 18-item Module is currently in use for a better understanding of food insecurity and severity internationally.

Overall, this study can be used as a reference point for further similar studies, including a tested methodology and initial findings of the food security experiences of families with children who attend childcare. In particular, there is potential to build on the findings of this study and further explore a measure that accurately measures Australians' food security experiences for purposes of planning, monitoring and evaluating related policy and programs, and also, measure prevalence rates.

## **CHAPTER 8**

### **CONCLUSIONS AND RECOMMENDATIONS**



As described in Chapter 1, my literature review found that household food insecurity is a real experience for many families in high income countries. The international literature has also shown that families adopt coping mechanisms to combat food insecurity experiences. Despite Australia's wealth, it is not immune to experiences of food insecurity as evident from data collected through national population surveys as well as focussed research within some populations. My study offers a unique perspective and its results contribute to (a) improved understanding of the food security experiences of Indigenous Australians and other Australians within the study populations; (b) how people cope with food insecurity within the study populations and; (c) possible effects on child health outcomes.

Chapters 3 to 7 elaborated on the methods, findings and discussion of the various stages within my overall study. In this final chapter, I will:

- Summarise the principle findings related to my research questions and the key contributions to the current literature;
- Summarise the general strengths and limitations of my studies;
- Formulate suggested recommendations; and
- Discuss further areas for research arising from my studies' findings.

### **8.1 Key findings and contributions to the current literature**

My studies were carried out with two cohorts of people where the first cohort was small and formed a pilot data set (Chapters 3 and 4) and the qualitative component of my thesis (Chapters 5). I then used the data from the first cohort to inform the second cohort methods (Chapter 6) resulting in findings presented in Chapter 7.

The first question posed in my thesis was “*Does food security status relate with the demographic and social determinant characteristics of Indigenous Australian families living in Darwin and Palmerston?*” The results presented in Chapter 4 showed that of the 32 participating households, 59% were identified as food secure and 41% were food insecure. As measured by the national indicator for food insecurity of an Indigenous Australian person living in a household that had run out of food (ABS 2015), the prevalence of food insecurity within this sample was higher than that of the estimated prevalence of 31% for remote and 20% for non-remote population. Socio-demographic characteristics related to the food insecure group were not dissimilar from other relevant published literature where household food insecurity has been found among at risk groups with young non-school aged children, where the primary carers are mothers, the unemployed or underemployed with low-incomes and low education attainment within general populations (Stevens 2010; Kaiser et al. 2007; Quandt et al. 2006) and Canadian Indigenous populations (Skinner et al. 2013; Ford et al. 2012; Egeland et al. 2010). A main finding was that those using public transport were more likely to experience food insecurity, even though most participants had access to a private vehicle for food shopping. Also identified in my research was that most participants were unemployed and had young children. Therefore, assistance with food shopping would be beneficial. As described in Chapter 4, Coveney and O’Dwyer (2009) suggested a similar service (taxi vouchers for food shopping) as that provided to the elderly and disabled who are government pension recipients. Families who are low-income, with young children and who receive government assistance would also benefit from a similar scheme. Another strategy is for existing government services that provide assistance

to low income families, to promote online grocery shopping and assist clientele with young children to register through use of existing facilities.

In Chapter 4, I also asked the question “*How reliable is the US 18-item module in measuring household food security status in Darwin and Palmerston families?*” I asked this question, as the US 18-item Module had not been used before with Indigenous Australians. Outcomes showed that the mUS 18-item Module only had fair agreement (within 2 weeks) within this population, suggesting that the tool is not repeatable or the food security status of the population changes rapidly. Responses to the items are within the previous 12 months and this timeframe may prove unreliable with responses for a few reasons. Potentially, there are difficulties in recalling food insecurity experiences within a 12-month period. Another possible reason is participants are concerned with the present and immediate future. Other research has also noted this timeframe to be potentially problematic for similar reasons aforementioned (Bickel 2000; Cohen et al. 2002 in Wunderlich and Norwood (eds.) 2010). For instance, Bickel (2000) has noted that shorter timeframes (30 days or 3 months) were robust and do not affect the validity of the responses. However, other studies have shown that the 18-item Module with use of the 12-month response timeframe is valid in other populations with sizable samples (Derrickson et al. 2000; Gulliford et al. 2006; Rafiei et al. 2009 and Bezuneh et al 2008). Nevertheless, my study raises the question whether a shorter timeframe (i.e. <12 months) is more appropriate when using with Indigenous populations.

Given the limited published data and the importance of how people coped with food insecurity, I then asked the question “*What are the factors perceived to influence*

*household food security and what coping strategies are Indigenous families putting in place?”* The four main themes identified were: experiences of food insecurity; influencing factors (major and minor); impact on food selection; and coping strategies. A major influencing factor of food insecurity, were times when there was not enough money due to the payment of bills and was termed “money tight”. ‘Money tight’ impacted on food selection, food availability and sometimes food quality. Coping mechanisms were to restrict food expenditure in ways of purchasing cheaper brands and restricting expenditure on unnecessary items, called “luxury foods” which were mostly sweet foods. Other reported coping strategies were staggering payment of bills and putting off paying bills. The experience amongst this study population of “money tight” due to the payment of large bills and general cost of living has also been reported by other researchers investigating food security experiences and influencing factors among low income populations (Quandt et al. 2006; Stevens et al. 2010; De Marco et al. 2009; Hoisington et al. 2002).

Participants reported social support as a major coping strategy which entailed relying on extended family members and friends to combat experiences of food insecurity. This relationship was based on reciprocity, as families managed their food insecurity experiences around pay periods and whose turn it would be to provide food. Other families whose experiences were less frequent reported going to family or friends to ask for money or to have a meal when there wasn’t enough money for food. The social network was not limited to money and food, as it was also accessed for social support, such as for looking after children and doing household chores. Reciprocal relationships have also been identified within other Australian literature as essential in maintaining and reinforcing cultural social bonds with individual and group

relationships (Broome 1994). In Indigenous Canadian food insecurity studies, ‘cultural sharing’ (Chan et al. 2006) and ‘sharing networks’ (Ford et al. 2012) are preferred terms in place of reciprocity, and have a role in maintaining and reinforcing family and broader community relationship obligations as well as cultural identity and practice among Inuit. Seeking assistance from family was not investigated nor reported in the study by Adams and colleagues (2012), which was also undertaken in an urban Indigenous Australian population. A potential reason is that the study (Adams et al. 2012) was undertaken with a food insecure population who accessed a voucher system to procure food. Markwick et al.’s (2014) study with food insecure Victorian Aboriginal and Torres Strait Islander peoples, investigated social support and significant findings were the inability of participants to seek assistance from family, friends and neighbours. Within a non-Indigenous context, reciprocity was also mentioned in Steven’s (2010) study, where young mothers would rely on family members for assistance with food and then ‘return the favour’ when family members experienced difficulties.

The cost of living as contributing to participants’ food insecurity experiences was also a dominant feature. Some participants purposely lived with extended family to mitigate potential food insecurity with the rising cost of living, even though they reported earning an adequate income. This has also been identified within other populations where the cost of living and cash flow problems (Chan et al. 2006), in particular the cost of home rental (Steven 2010) among the low income earners, impacted on food security. Within my qualitative study (Chapter 5), a contributing factor to food insecurity experiences was poor housing maintenance, particularly inadequate kitchen facilities, as associated with their experiences of food insecurity,

although kitchen functionality was not found to be associated with food insecurity in Chapter 4. Within the Indigenous Australian context, inadequate functioning of kitchen facilities has been identified with poor nutrition (Torzillo et al. 2008; Bailie and Runcie 2001). In my study, as similar to other studies, participants perceived healthier food to be more expensive to less healthy food and expressed frustrations at not always being able to afford healthier food options and bewilderment at why unhealthier foods appeared cheaper. Other studies have reported the cost of healthy food options as a barrier to healthy eating and have commented that low income gave participants little option but to buy cheaper highly refined and energy dense foods (Stevens 2010; Brimblecombe et al. 2014; Chan et al. 2006).

Using the modified version of the US 18-item Module, specifically the additional questions requesting information about coping mechanisms for food insecurity, the next phase of my PhD involved 186 households with 195 children enrolled from 17 childcare centres in my sampling target regions (methods in Chapter 6). Three questions were asked in this larger cohort and the results are presented in Chapter 7.

*“What are the influencing factors associated with food security status in families of children attending child care centres?”* was the first question asked in this larger cohort (chapter 7). Among this cohort, 12% were food insecure. This value is higher than the national prevalence of 4.0% and 4.7% for the Northern Territory (ABS 2015). A higher prevalence of food insecurity has been reported in similar Australian studies among low socio-demographic populations [21.9% (Nolan et al. 2006) to 34% (Ramsey et al. 2011)].

Within my study the factors associated with food security status included social determinants, determinants of food security and psychological distress. A main finding was that all participants reported having access to a supermarket to undertake grocery shopping and most had use of private transport (car), which has been found in other Australian studies irrespective of socioeconomic status, though not necessarily among families with young children (Law et al. 2011; Coveney and O'Dwyer 2009; Turrell et al. 1996).

With respect to other known factors that influence food insecurity, findings within my study were in contrast to other studies. For instance, food security status was not found to be associated with measures of socio-economic status, as there were no significant differences in employment status, income level and level of education attainment between the food secure and insecure groups. Other similar studies where food insecurity exists in vulnerable groups with young children, have identified food insecurity to be related to mothers who are unemployed (Ramsey et al. 2011) or underemployed and with a low-income and low education attainment (Stevens 2010; Kaiser et al. 2007; Quandt et al. 2006; Kaiser et al. 2003). Noted within the findings of my study was that public transport use was significantly associated with food security status. In other studies, limited access to a private car was found to restrict access to larger grocery stores (supermarkets) and participants tended to access food outlets within their living vicinity, where food was more expensive (Stevens 2010; De Marco et al. 2009; Clifton 2004) than in the larger supermarkets.

One of the most notable findings in my study is the significant association between food insecurity and higher levels of psychological stress status of carers as measured

on K10. Participants who reported higher levels of psychological distress were more likely to be food insecure, have lower income, lower levels of education attainment and reported higher use of public transport. Other studies that have examined psychological distress and wellbeing and analysed against food security status have identified relationships with low income (Huddleston-Casas et al. 2008; Carter et al. 2011; Kaiser et al. 2007; Casey et al. 2006; Stuff et al. 2004; Vozoris and Tarasuk 2003; Seifert et al. 2001) and low education attainment (Carter et al. 2011; Huddleston-Casas et al. 2008; Kaiser et al. 2007; Casey et al. 2006; Seifert et al. 2001). However, to my knowledge, no studies have investigated the relationship between food security status, psychological distress levels or wellbeing levels and public transport use as a determinant of food security. This is an important finding that requires further exploration to confirm relationships between variables.

The second question addressed in the larger cohort was: *“Does food security status have an impact on child health outcomes in children attending child care centres?”* Data on children’s height and weight for age z-scores and haemoglobin levels were collected to answer this question. My study found no significant difference in haemoglobin levels, height-for-age and weight-for-height z-scores between the food secure and food insecure groups. However, the food insecure group had a significantly higher proportion of children in the overweight group (weight-for-age of  $> +2$  z-score) when compared with the food secure group ( $p=0.018$ ). Although the data was significant between groups, the small numbers render interpretation of this data with caution.



My finding is however not surprising given the published literature associating food insecurity with overweight and obesity in children in other populations including , Inuit children (Egeland et al. 2009), Korean children (Oh and Hong 2003 ) and children in the US (Bhattacharya et al. 2004; Casey et al. 2001). Reasons include consumption of higher energy dense diets among the food insecure households, related to lower cost of these foods (Stevens 2010; Chan et al. 2006; Ricciuto and Tarasuk 2006; Drewnowski and Darmon 2005). Other possible issues are limitations with access to larger supermarkets where there is more of a variety and better priced (Stevens 2010; De Marco et al. 2009; Nolan et al. 2006; Clifton 2004).

My study's findings on the children's haemoglobin are in contrast to other studies which reported anaemia rates (related to iron deficiency) in food insecure children (Brotanek et al. 2007; Skalicky et al. 2006). As described in Chapter 7, potential reasons are my study recruited through child care centres and not within known food insecure populations who are recipients of food assistance programs and my method to obtain haemoglobin readings differed to other studies. Of interest to my findings, Brotanek et al.'s (2007) study reported a lower prevalence of iron deficiency anaemia among toddlers in day care (5%) when compared with toddlers not in child care (10%). Therefore, being in child care may be a protective factor against anaemia and may provide an explanation for why iron deficiency was not found in my study sample.

The final question answered within Chapter 7 was, *"How reliable is the modified US 18-item household food security module in measuring household food security status*

*in families of children attending child care centres?”* In the Australian context this is one of the first studies to test the reliability of the US 18-item Module. The only other Australian study (Ramsey et al. 2011) measured the scale reliability through internal consistency within a low socio-demographic population (Cronbach’s alpha 0.90). The kappa analysis of the mUS 18-item Module test-retest in my study showed excellent agreement of the overall score for the 18 items within the study sub-sample. Though, the first question ‘worried food would run out and can’t buy more’ performed only moderately (Kappa 0.65). The repeatability was excellent overall in this cohort, in contrast to findings from the smaller Indigenous Australian cohort. Thus my studies suggest that within any cohort, a test-retest should be undertaken to ensure validity of this tool.

## **8.2. Strengths and Limitations**

To my knowledge, there have been no other studies that have investigated relationships between food insecurity, socio-demographic factors and levels of psychological distress or wellbeing among carers of young children of Indigenous Australian families. Even though the Indigenous Australian study sample size was small (n=32 households), my quantitative findings were enriched by a qualitative aspect. The sampling frame was unique, unlike other similar research, as participant recruitment was not undertaken within known food insecure populations and therefore, provides a snapshot of food insecurity within a general Indigenous Australian population.

The larger study is one of a few studies that have used the US 18-item Household Food Security Survey Module within an Australian population and is arguably the

first to have used the US 18-item Module to assess food insecurity to investigate household food security status and its determinants within an urban Australian population in Northern Australia. Within the limited Australian food security research context, most research targeting food security is population based and not specific to families with young children. Other aspects of interest found in my study are the relationships with household food insecurity and psychological distress levels of the primary carer. This has not been investigated previously within an Australian context and adds to the knowledge of understanding the complexity food insecurity experiences. Therefore, this study provides new knowledge to the literature and insight into Australian families' food security experiences.

As discussed in the preceding chapters, there are limitations to work findings presented thus far. In summary, the main ones are: (a) possible bias within the Indigenous Australian sampling with findings reflecting the views of one gender more so than the other, as a majority of participants in this study were female (27 female and three male) and (b) the sample size relating to the findings described in Chapter 7 including the few Indigenous Australian families.

These factors may under- or over-estimate the level of food insecurity. In the larger sample, recruitment was undertaken through long day child care centres where children receive nutritious meals during the week days.

### **8.3. Implications and suggested recommendations**

My study identified that participants' food insecurity experiences were related to monetary expenditure outweighing income, particularly payment of larger bills and

that food insecurity tended to be sporadic and short term. Within the Indigenous Australian population, experiences for some were limited income and expenses outweighing available funds. This results in the redirection of funds to fulfil occasional needs that are of higher priority and place strain on an already constrained budget with potential to result in less money available for food. One possible solution to this problem is enabling direct debit of smaller and regular payments to coincide with pay periods. Potentially, this would entail regular payment of bills in smaller amounts and may have an effect on not placing families under undue financial pressure.

Transport, preferably access to a private car, was also deemed an essential by some to undertake food shopping. Since mentioned are barriers to undertake a food shop and access 'healthy food', there could be possible scope for services and other assistance programs to consider these needs. For instance, food shopping assistance for older Australians and the disabled is provided through government and non-government services. Major supermarket chains such as Coles and Woolworths provide an online shopping and delivery service for a fee. This may not be available by all stores and may not appeal to all consumers. However, it could be considered by government and non-government services to provide food shopping assistance, including a subsidised or free food shopping delivery service, for low income families with young children.

There is a perception that the cost of healthy foods makes it unaffordable for families within this study population. Therefore, policy to improve economic access to ensure availability of affordable healthy food options as a strategy for better health

outcomes is important. Local councils could consider availability of public allotments to encourage community or family group food gardening to supplement diets. However, this option was not considered by study participants as a coping strategy. Research exploring supplementation of diets through growing local produce (i.e. allotment gardening) and/ or accessing traditional foods, would be beneficial in gaining an understanding of the variety of food sources available. The perception of fresh fruit and vegetables being costly is worth further research, particularly in assessing the affordability of healthy foods within the study location.

From the perspective of appropriate and sustainable safety nets that provide assistance to families, it is important to acknowledge the existence of support services accessed by families. This strategy is not generally recognised within the mainstream and is specific to Indigenous Australians within the study setting. These include positive family associations where support is provided for cultural reasons. One of the main coping strategies identified within this study was seeking assistance from family when food insecurity was experienced. Potential scope for current services is to consider an approach in connecting with family networks for provision of support services, such as financial counselling. Such services have potential to provide peer support family counselling where members experiencing difficulties are supported by family member(s) to engage with services and work through issues.

Findings from my research provide an understanding of the food security situation, families' experiences of food security as well as coping strategies used to combat food insecurity for the study populations. These findings are also timely in understanding the food security situation within the study site (Darwin and

Palmerston) and provide insight into where further research is required and the relevance of findings to inform policy and practice change.

A national true prevalence of food insecurity (and levels of severity) within population groups is required to inform policy. An appropriate measure is required that acts more than just a screening tool as experiences of food insecurity is broader than just an economic problem. To address the problem understanding the complexity of the issue, it is recommended that an appropriate measure of food security that also captures peoples' experiences, coping strategies and broader factors that impact on food security status (e.g., social determinants and determinants of food security, psychological distress) is required. The methods used in my study captures these aspects, though requires modification for a widespread population use.

In the test-retest findings of the mUS 18-item Module that was not repeatable in the Indigenous Australian cohort (Chapter 4), it is recommended that adjustments are made to the module. These adjustments should include changes to the terminology, reframing statements as questions and reporting as yes/no responses and the time frame (3 months instead of 12 months). However after the modifications, a revalidation study that includes cognitive testing of the questions is required in a future study.

#### **8.4. Further suggested research**

From my studies' results, it is clear that food insecurity is a complex issue and that future research needs to be considered. My studies have made a start on food security issues relating to Indigenous Australian and other people living in Darwin

and Palmerston, Northern Territory. However, clearly other research is required and suggestions are briefly discussed below.

The US 18-item module has potential for use within the Australian context. However, based on the test-retest outcomes for both samples within my study, a study focussed on validating and testing the reliability of the tool in broader and larger Australian populations, would be of benefit. As mentioned above, the mUS 18-item Module that is modified requires a revalidation study that includes cognitive testing of the questions. This should be performed in different population groups in Australia (e.g. remote and urban Indigenous Australian groups, other minority groups). Further cognitive testing to understand the mUS 18-item module questions within the Australian context would provide valuable insight into the understanding and interpretation of the current wording of questions.

Given the limitation discussed above regarding the gender imbalance in my studies, consideration in sampling to obtain a gender balance may provide insight into the males' food insecurity experiences and value add to the current findings. Further similar studies may need to consider recruitment and sampling strategies that address gender balance.

### **8.5. Reflections and concluding statement**

Given the small sample size of the Indigenous Australian population, there are a number of points to consider when undertaking research and recruitment. There are also implications for understanding and interpreting findings, as well as the broader applicability of findings to other Indigenous Australian communities.

In general, difficulty in recruiting within a non-captive setting (i.e. hospital) is not uncommon, as there are many demands on people's time and a study is further down the priority list. Interactions with Indigenous Australians are also based on trust and mutual respect. Therefore potential participants are engaged through already established trusted relationships and networks. Research studies that are not engaging with participants or are not of immediate interest and/ or benefit, tend to yield less interest. One of the issues with the low recruitment within my study was the recruitment timeframe and engaging the Aboriginal research assistant known to the study population when the study was well into the recruitment timeframe. There may have been a different outcome with respect to sample size if the strategy to engage someone known to the community, in a positive light, occurred earlier in the study participant recruitment phase.

Due to small sample sizes, as is the case with my study, the findings of this research are only applicable to the participating families and applying findings to broader Indigenous Australian families with young children is questionable. Therefore, there may be merit in multisite studies, to not only broaden the recruitment pool, but include diversity within the sample.

Overall, this study can be used as a reference point for further similar studies, including a tested methodology and initial findings of the food security experiences of Australian families. In particular, there is potential to build on the findings of this study and further explore factors that influence food security and a measure that accurately assesses Australians' food security experiences for purposes of planning, monitoring and evaluating related programs as well as measure prevalence rates.



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## APPENDICES

## APPENDIX 1.1

### Summary of Australian studies measuring food security status

First author and year of report; Objectives used to assess food security and brief study description.	Population studied and main findings	comments
<p><b>Author:</b> Radimer (1997)</p> <p><b>Objective:</b> Investigate the prevalence of food insufficiency and factors associated with it.</p> <p><b>Brief description:</b> Cross sectional survey undertaken in 13 regions of Queensland. Data collection commenced in 1993 and two food sufficiency questions included in a regional health survey. <i>'In the last 12 months were there times that your household ran out of food and there wasn't money to buy more?'</i> and; <i>'In the last 12 months, has anyone in your household eaten less than should because you couldn't afford enough food?'</i> These questions are based on two questions that form a series of items derived</p>	<p>Total sample size 10,451 individuals; questions were asked of individuals aged 18 years of age and over.</p> <p><b>Findings:</b> 9.7% of households and 6.4% of individuals reported food insufficiency; food insufficiency significantly higher for women than men; urban than rural and for younger than older participants (p&lt;0.0001).</p>	<p>Study did not request or report on households with and without children.</p>

from research exploring hunger in the US.		
<p><b>Author:</b> Quine (2006)</p> <p><b>Objective:</b> To identify the extent of food insecurity amongst older Australians, and the characteristics of those who experience this condition.</p> <p><b>Brief description:</b> Cross sectional population survey, The Older Person's Health Survey, undertaken in NSW. Single Australian item used to assess food insecurity, 'In the last 12 months, were there any times that you ran out of food and couldn't afford to buy more?'</p>	<p>Sample size 8881 individuals aged <math>\geq 65</math> years living independently in the community.</p> <p><b>Findings:</b> Food insecurity prevalence 2%; slightly higher in females than males, but not significant (<math>p=0.32</math>); food insecurity decreased with increasing age, 3.0% in 65-69 years of age group compared with 0.5% in 85 years of age and over.</p>	Older population, not families with young children.
<p><b>Author:</b> Nolan (2006)</p> <p><b>Objective:</b> To determine the prevalence of food insecurity within an urban population of social disadvantage in readiness for a health promotion response.</p>	<p>Low-socioeconomic groups. Sample size 4,239 households. Participant ages 18 – 89 years of age. 56% of households had children, no ages specified. Food</p>	<p>Data on number of children in household collected. Food security assessments</p>

<p><b>Brief description:</b> Cross sectional survey conducted in 3 disadvantaged locations of south-western Sydney. Used 16-item US household food security survey module (essentially the 18-items numbered as 16) and single Australian item: ‘In the past 12 months, were there any times that you ran out of food and couldn’t afford to buy more?’ Response timeframe for both measures within the previous 12 months.</p>	<p>insecurity prevalence of 21.9% using 16-item tool and 15.8% using single Australian item. Conclude single item has high specificity (96%) and low sensitivity (56.9%).</p>	<p>undertaken with some individuals where English not first language and administered in participants’ languages.</p>
<p><b>Author:</b> Temple (2006)</p> <p><b>Objectives:</b> Examine the (i) prevalence of food insecurity among older persons; (ii) the characteristics of the food insecure; and (iii) the association between food insecurity and wellbeing.</p> <p><b>Brief description:</b> 2001 National Health Survey data used to measure prevalence of food insecurity. Question ‘In the last 12 months, were there any times that you ran out of food and couldn’t afford to buy more?’</p>	<p>2.8% of 4,650 individuals aged 55 years old and over food insecure. Compared with couple only households, lone females and lone males (<math>p &lt; 0.001</math> respectively) more likely to be food insecure.</p>	<p>Older population, not families with young children.</p>



<p><b>Author:</b> Gallegos (2008)</p> <p><b>Objective:</b> To identify food insecurity and examine its association with socio-demographic factors in a group of newly arrived refugees.</p> <p><b>Brief description:</b> Developed a 7 question questionnaire with 3 of the seven questions based on 1995 National Nutrition Survey single food insecurity item; asked the single food insecurity item (within the timeframe of being in Australia) and if answered affirmatively, asked how often occurred - often, sometimes or rarely; and asked reason for running out of food. Survey administered by employees of a refugee support service based in Perth, W.A.</p>	<p>Convenience sample of 51 participants.</p> <p>71% food insecure (reported running out of food). Of this percentage, 14% reported running out sometimes, 16% often and 29% rarely.</p>	<p>Age and gender of participants not specified.</p>
<p><b>Author:</b> Temple (2008)</p> <p><b>Objectives:</b> (i) examine the prevalence and correlates of the severity of food insecurity; and (ii) uncover potential health and nutrition outcomes.</p> <p><b>Brief description:</b> Data from the 2004/05 ABS National Health Survey,</p>	<p>Study sample of 19501 individuals aged 18 years and over. 5.1% of participants reported food insecurity. Of the 5.1%, 3% moderately food insecure and 2% severely</p>	<p>Study did not request or report on households with and without children.</p>

<p>food security questions: <i>'In the last 12 months, were there any times that you ran out of food and couldn't afford to buy more?'</i> and <i>'When this happened, did you go without food?'</i> Then categorised as food secure (no response provided), moderate food insecurity (yes response to one question) and severe food insecurity (yes responses to both questions).</p>	<p>food insecure. Other findings indicate, severely food insecure less likely to be employed (44%) compared with moderately food insecure (50%) and food secure (62%).</p>	
<p><b>Author:</b> Foley (2009)</p> <p><b>Objective:</b> To estimate the extent of food insecurity in South Australia and its relationship with a variety of socio-economic factors.</p> <p><b>Brief description:</b> Data collection through South Australian Monitoring and Surveillance System (SA Health) collects data on key health indicators through population survey. Single item food security question asked: <i>In the last 12 months, were there any times that the food you have bought just didn't last, and you didn't have money to get more?'</i> Question was asked monthly and asked within the timeframe every 3 months for</p>	<p>Study sample 19037 individuals and 7% identified as food insecure.</p>	<p>Australian population  <math>\geq 18</math> years of aged.            Study did not request or report on households with and without children.</p>

adults and monthly about children (aged 16years and under) between July 2002 and December 2007.		
<p><b>Author:</b> Ramsey (2011)</p> <p><b>Objective:</b> Investigate the associations between food insecurity, potential determinants and health and developmental outcomes among children.</p> <p><b>Brief description:</b> Household food security data was collected using the 16-item US household food security survey module (essentially the 18-items numbered as 16); socio-demographic characteristics and children's weight, health and behaviour were collected.</p>	<p>Sample of 185 households from low socio-demographic suburbs in Brisbane (QLD) with children aged 3 – 17 years.</p> <p>34% of households were food insecure;</p> <p>23.8% low levels of food security; 8.1% very low levels of food security; and 2.2% very low levels of food security among children. By age group; 3- 7 years, 8-12 years and 13-17 food security status was 61.9%, 56.7% and 59.5% respectively and with food insecurity status, 38.1%, 43.3% and 40.5% respectively.</p>	

<p><b>Author:</b> Markwick (2014)</p> <p><b>Objective:</b> Explain the relationship between food insecurity and Aboriginal and Torres Strait Islander status in Victoria, Australia.</p> <p><b>Brief description:</b> Used cross-sectional data from the 2008 Victorian Population Health Survey and includes food security data based on question <i>‘In the last 12 months, were there any times that you ran out of food and couldn’t afford to buy more?’</i> Socio-demographic, geographic and lifestyle risk factors, as well as social support data also collected through the survey.</p>	<p>Sample of 34,168 individuals aged 18 years and over. Aboriginal and Torres Strait Islanders (n=339) 20.3% prevalence of food insecurity prevalence compared with 5.4% of the non-Indigenous population. Aboriginal and Torres Strait Islander people more likely to be a current smoker (AOR 3.8); obese (AOR 4.9) of low-income (OR 3.9); unable to obtain assistance from family (OR 4.1), friends (OR 4.8) and neighbours (4.5); be a lone parent (OR 4.6) be in a household with a child (4.4) and larger household size (4.6)</p>	<p>Australian population ≥18 years of aged. Study identified Indigenous Australian status; did not request or report on households with and without children.</p>
<p><b>Author:</b> Russell (2014)</p>	<p>Sample of 3068 participants. 13% of</p>	<p>Older population, not</p>

<p><b>Objective:</b> Estimate the prevalence of food insecurity and identify associated characteristics in a cohort of older Australians.</p> <p><b>Brief description:</b> Cross sectional study part of larger study, The Blue Mountains Eye Study, community living participants aged 49 years and older. 12-item food security survey used and food insecurity status based on positive response to the question <i>‘In the last 12 months, were there times that your household ran out of food and there wasn’t money to buy any more food?’</i></p>	<p>participants were identified as food insecure with women (15.7%) experiencing higher levels of food insecurity when compared with men (9.4%). By age group, &lt; 70 years experienced higher levels of food insecurity when compared with the <math>\geq 70</math> year old age group (15.7% v 8.4%)</p>	<p>families with children.</p>
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### **Appendix 3.1.**

#### **USDA 18-item Household Food Security Survey Module; items listed in order of severity (USDA 1995)**

#### **Modified USDA 18-item Household Food Security Survey Module (mUS 18- item Module) (Leisa McCarthy, April 2009)**

#### **Researcher Use**

Household code      1 ☐ ☐      Date      -----/-----/-----

#### ***Marginally food-secure***

1. Worried about whether food would run out before had enough money to buy more.

(1) ☐ Yes      (0) ☐ No

2. Food bought did not last (until next pay), and did not have money to get more.

(1) ☐ Yes      (0) ☐ No

#### ***Food-insecure without hunger***

3. Could not afford to eat healthy foods at each meal.

(1) ☐ Yes      (0) ☐ No

4. Relied on only a few kinds of low-cost foods to feed the child/ children because running out of money to buy food.

(1) ☐ Yes                      (0) ☐ No

- 5.** In the last 12 months from this month, did you or other adults in your household cut the size of your meals or skip meals because there was not enough money for food?

(1) ☐ Yes                      (0) ☐ No

- 6. If Q5 is yes:** How often did this happen in the last 12 months from this month:

(1) ☐ Almost every month      (2) ☐ Some months but not every month

(3) ☐ Only 1 or 2 months

- 7.** Could not feed child or children healthy foods at each meal because could not afford to.

(1) ☐ Yes                      (0) ☐ No

- 8.** In the last 12 months from this month, did you ever eat less than you felt you should because there was not enough money to buy food?

(1) ☐ Yes                      (0) ☐ No

***Food-insecure with moderate hunger***

- 9.** Child or children were not eating enough food because could not afford enough food.

(1) ☐ Yes                      (0) ☐ No

**10.** In the last 12 months from this month, were you ever hungry but did not eat because you could not afford enough food?

(1) ☐ Yes                      (0) ☐ No

**11.** In the last 12 months from this month, did you lose weight because you did not have enough money for food?

(1) ☐ Yes                      (0) ☐ No

**12.** In the last 12 months from this month, was the size of the child or children's meals made smaller because there was not enough money for food?

(1) ☐ Yes                      (0) ☐ No

***Food-insecure with severe hunger***

**13.** In the last 12 months from this month, did you or other adults in the household ever not eat for a whole day because there was not enough money for food?

(1) ☐ Yes                      (0) ☐ No

**14. If Q13 is yes:** How often did this happen (answers as in Q8)?

(1) ☐ Almost every month      (2) ☐ Some months but not every month  
(3) ☐ Only 1 or 2 months

**15.** In the last 12 months from this month, was your child or children ever hungry but you just could not afford more food?

(1) ☐ Yes                      (0) ☐ No



**16.** In the last 12 months from this month, did your child or children ever miss meals because there was not enough money for food?

(1) ☐ Yes                      (0) ☐ No

**17. If Q16 is yes:** How often did this happen (answers as in Q8)?

(1) ☐ Almost every month      (2) ☐ Some months but not every month  
(3) ☐ Only 1 or 2 months

**18.** In the last 12 months from this month, did your child or children ever not eat for a whole day because there was not enough money for food?

(1) ☐ Yes                      (0) ☐ No

**Scoring of the food security scale: mUS 18-item Module**

<b>Food security level</b>	<b>Number of affirmative responses 18-item, households with children</b>	<b>Total score (completed by researcher)</b>
Food-secure	0 – 2	
Food-insecure	3-7	
Low food security	8-12	
Very low food security	13-18	

## Appendix 3.2

### Stage 1 Social Determinants Questionnaire

The questionnaire should take about 10 minutes to complete. It is to get an idea of the household's income, expenditure on food, parent/ carers educational background, employment and household details. This information will help with giving a bigger picture of food security in the Darwin-Palmerston Indigenous Australian community.

#### Researcher Use

Household code      3 ☐ ☐      Date      ----/----/----

#### SECTION 1 – *Parent/ Carers and Household Details*

1. Indigenous Australian Status (Please place a √ in the box of choice)

(1) ☐ Aboriginal      (2) ☐ Torres Strait Islander      (3) ☐ Both      (4) ☐ Neither

2. Gender (Please place a √ in the box of choice)

(1) ☐ Male      (2) ☐ Female

3. Parent of child/ren      (1) ☐ Mother      (2) ☐ Father

Carer of child/ren      (3) ☐ Grandmother      (5) ☐ Aunt      (7) ☐ Sister  
(4) ☐ Grandfather      (6) ☐ Uncle      (8) ☐ Brother

(9) ☐ Other (Please comment)

.....

4. Parent/ Carer Age (in years)      ☐ ☐

5. Within the last 4 weeks:

a) What was the total number of people living in the house?

b) How many people living in the house were within the following age groups?

(Please complete all boxes)

15+ years        11 to 14 years        5 to 10 years

2 to 4 years        6 to 23 months

**SECTION 2 – Educational and employment details**

Education details

6. Which of these describes the **highest qualifications/ level of education** you have completed (Please place a √ in the box of choice).

- |   |   |
|---|---|
| (1) <input type="checkbox"/> Never attended school              | (7) <input type="checkbox"/> Certificate/ Diploma     |
| (2) <input type="checkbox"/> No formal qualifications           | (8) <input type="checkbox"/> University degree        |
| (3) <input type="checkbox"/> Primary School                     | (9) <input type="checkbox"/> Higher University degree |
| (4) <input type="checkbox"/> Year 10 or equivalent              | (77) <input type="checkbox"/> Don't know              |
| (5) <input type="checkbox"/> High School or Yr 12 or equivalent | (88) <input type="checkbox"/> No response             |
| (6) <input type="checkbox"/> Trade/apprenticeship               | (99) <input type="checkbox"/> Missing data            |

Employment details

7. Which of the following describes your current employment status? Select as many that apply (Please place a ✓ in the boxes of choice).

<b>Employment description</b>	<b>Response (Yes/ No)</b>	<b>Employment description</b>	<b>Response (Yes/ No)</b>
Working full-time	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Full-time student	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Working part-time (not CDEP)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Part-time student	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
CDEP	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Not working (but not retired)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Casual Work	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Retired	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Home duties	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Permanently unable to work/ ill	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Other, please comment			

### **SECTION 3 – *Income and financial details***

#### **Income details**

**8.** What is the estimated NET (after tax) Household weekly income? (Please place a  $\sqrt{\phantom{x}}$  in the box of choice).

- |   |   |   |
|---|---|---|
| (0) <input type="checkbox"/> No income      | (1) <input type="checkbox"/> \$1 - \$99     | (3) <input type="checkbox"/> \$100 - \$199      |
| (4) <input type="checkbox"/> \$200 - \$299  | (5) <input type="checkbox"/> \$300 - \$399  | (6) <input type="checkbox"/> \$400 - \$499      |
| (7) <input type="checkbox"/> \$500 - \$599  | (8) <input type="checkbox"/> \$600 - \$699  | (9) <input type="checkbox"/> \$700 - \$799      |
| (10) <input type="checkbox"/> \$800 - \$899 | (11) <input type="checkbox"/> \$900 - \$999 | (12) <input type="checkbox"/> \$1,000 - \$1,199 |
| (13) <input type="checkbox"/> Other .....   |   |   |

**9.** What is your main source of income? (Please place a  $\sqrt{\phantom{x}}$  in the box of choice).

- (1) ☐ CDEP
- (2) ☐ Wages or salary (including from own incorporated business)
- (3) ☐ Profit or loss from own unincorporated business or share in a partnership.
- (4) ☐ Dividends or interest
- (5) ☐ Any Government pension or allowance
- (6) ☐ Child support or maintenance
- (7) ☐ Superannuation or Annuity (non-Government pension or allowance)
- (8) ☐ Workers' Compensation
- (9) ☐ Other (Please comment) .....

**10.** What pay period does that cover? (Please place a  $\sqrt{\phantom{x}}$  in the box of choice).

- (1) ☐ Week
- (2) ☐ Fortnight
- (3) ☐ Four weeks
- (4) ☐ Calendar month
- (5) ☐ Year
- (6) ☐ Other (Please comment).....

### Financial expenses

**11.** Can you estimate how much of the household income is spent on food and beverages for the household? (Please place a √ in the box of choice).

(1) ☐ Quarter or less    (2) ☐ At least half    (3) ☐ More than half

### **SECTION 4 – *Household details***

#### Food Storage and cooking facilities

**12.** Does this dwelling have a working stove, oven or other cooking facilities? (Please place a √ in the box of choice).

(1) ☐ Yes    (0) ☐ No

**13.** Does this dwelling have benches in good working order? (sealed, waterproofed, not falling apart) (Please place a √ in the box of choice).

(1) ☐ Yes    (0) ☐ No

**14.** Does this dwelling have kitchen cupboards in good working order? (doors, waterproofed, resistant to rot and pests, above bench height) (Please place a √ in the box of choice).

(1) ☐ Yes    (0) ☐ No

**15.** Does this dwelling have a working refrigerator? (Please place a √ in the box of choice).

(1) ☐ Yes    (0) ☐ No

## SECTION 5 – Food and Transportation

### Food Outlet details

**16.** Where do you usually shop for groceries? (Please place a √ in the box of choice).

Food Outlet	Yes/ No	Food Outlet	Yes/ No
Supermarket (Coles, Woolworths)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Corner/ local shop (incl. markets, trucks)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Service Station	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Fruit/ Vegetable outlets	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Bakery	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Butchers	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Fish and seafood outlets	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Takeaway/ fast food outlet	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Other, please comment:   			

**17.** What are the reasons you shop at this/ these places? (Please place a √ in the box of choice).

- (1) ☐ Where I want to shop      (2) ☐ Transport problems      (3) ☐ Illness  
(4) ☐ Other (please comment)

.....

### Transportation

**18.** In the last two weeks, what forms of transport have you used to access food outlets? (Please place a  $\sqrt{\quad}$  in the box of choice).

Transport type	Yes/ No	Transport type	Yes/ No
Bus	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Bicycle	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Car (passenger)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Walk	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Car (driver)	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Motorcycle	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Taxi	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No	Never go out/ housebound	(1) <input type="checkbox"/> Yes (0) <input type="checkbox"/> No
Other, please comment:			

**19.** If you have problems getting to places you need to go, is it often? (Please place a  $\sqrt{\quad}$  in the box of choice).

- (1) ☐ Never go out/ housebound      (2) ☐ Sometimes have problems  
(3) ☐ Never have problems      (4) ☐ Often have problems



**In the last four weeks how often did you feel?**

**Tired out for no good reason?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Nervous or anxious?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**So nervous nothing could calm you down?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Hopeless (without hope)?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Restless or jumpy?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

Kessler 10 Wellbeing scale

## In the last four weeks how often did you feel?

**So restless you could not sit still?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Depressed?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Everything was an effort?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**So sad nothing could cheer you up?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

**Worthless?**

Comments

None of the time   Little of the time   Some of the time   Most of the time   All of the time

Kessler 10 (K10) Wellbeing scale

### Scoring framework for Kessler 10

For each question

Question response	Score
None of the time	1
A little of the time	2
Some of the time	3
Most of the time	4
All of the time	5

Overall score

Psychological Distress rating	Score
Low	10 - 15
Moderate	16 - 21
High	22 - 29
Very high	30 - 50

## Appendix 3.4

### Stage 2 Inductive development processes towards key guiding questions for the in-depth qualitative interviews

Theme	Notes	Guiding questions
<b>Influencing factors</b>		
Income quarantining (Basic Card)	<p>Limited control over own money.</p> <p>Anxious when going shopping, as don't know how much money available on basic card for spending.</p> <p>Feelings of shame/ embarrassment/ anger when</p> <ul style="list-style-type: none"> <li>- over purchase and can't pay for it (not enough money on card) and don't have extra cash.</li> <li>- On the scheme and have no say in being on it or not.</li> </ul>	<p>Tell me more about your experiences with the Basic Card.</p> <p>Why do you like/ dislike being Income managed?</p> <p>How does this make you feel?</p>
Housing problems (more	House needs fixing, takes a long time before something is	Tell me about your house. Is everything good? i.e., windows,

around maintenance)	<p>done, participant has little control over the situation.</p> <p>Limited availability of public housing, hard to find a place to live.</p> <p>Sense of feeling powerless, beyond people's control</p>	<p>benches, etc.?</p> <p>Does anything need to be fixed?</p>
Food preparation and cooking facilities	<p>Food storage, preparation and cooking facilities:</p> <ul style="list-style-type: none"> <li>- Need for working stove</li> <li>- Need for a freezer</li> </ul>	<p>Do you like to cook?</p> <p>Can you tell me about your experiences with cooking (good or not so good).</p> <p>What stops you from cooking?</p>
<b>Money problems</b>	<p>About not having enough money to fulfil own and families' needs/ wants/ requirements.</p> <p>Impact of the cost of living in Darwin and Palmerston – everything is expensive.</p> <p>Limited money, prioritise what spending on</p> <p>Always make sure the children are fed, don't go without.</p>	<p>Do you have enough money for what you need?</p> <p>If no money problems/worries, what do you do to make sure everything is good?</p> <p>Can you tell me about your money problems/ worries?</p> <p>How often do you have money problems/ worries?</p> <p>Are money problems ongoing (all the time)?</p> <p>When you have money</p>

		<p>problems, how do you prioritise your spending?</p> <p>Are there things that do you do to cope with the problem?</p>
<b>Social Inclusion</b>	<p>Not wanting money problems to impact on children's lives to point where excluded from social events, outings, what their peers have, etc.</p>	<p>Is it important to you and your kids that you don't miss out on what other families have?</p> <p>What are some of the things you do to make sure you and your kids don't miss out on having what others have?</p>
<b>Budgeting</b>	<p>Always make sure money for food, even if not healthy.</p> <p>An already tight budget for food and regular expenses.</p> <p>Additional expenses puts a strain on the budget therefore, spend less on food and tend to eat less healthy.</p>	<p>How do you make sure there is enough money for things you/ your family need between paydays?</p> <p>Does this always work, or do you sometimes find it hard?</p> <p>What else do you do to try and make it work?</p>
<b>Filler Foods</b>	<p>Low cost, high calorie foods to stretch meals and 'fill you up' – bread and rice.</p> <p>E.g of filler foods for a meal - cheap tinned meats (hamper)</p>	<p>Do you have enough food at each meal for everybody? What do you do to make sure everyone has enough food?</p> <p>Tell me about these foods (filler</p>

	and rice with bread.	<p>foods) and the reasons you choose them?</p> <ul style="list-style-type: none"> <li>- Cheaper, feed more people (stretch meals) and fill you up.</li> <li>- Comfort, familiar food</li> </ul>
<b>Wellbeing</b>	<p>2 participants talked about feeling sad.</p> <p>As mentioned previously, feelings of shame, embarrassment, anger, anxiety, powerless.</p>	<p><i>If possible, find out more if these feelings are related to money worries/ problems.</i></p> <p>How do you feel when you don't have enough money?</p> <p>Do you think about having enough money a lot?</p>
<b>Other's worse off</b>	<p>Acknowledge other families experiences similar problems and probably more worse off.</p> <p>However, also put this down to possible use of drug and alcohol and this is where money is diverted to.</p>	<p>From what you know, do you think your family 'has it hard' compared to other families?</p>
<b>Transport</b>	<p>Few transport issues to go places to shop, particularly when relying on public transport and travelling with</p>	<p>What are your experiences with having regular transport to go shopping?</p>

	small children	
<b>Social problems</b>	Identify money (income) diverted to social problems such as drug, alcohol and gambling impact on having enough food.	What are your thoughts on why some families may experience problems with having enough food?
<b>Food Shopping</b>	Transport and the amount of shopping undertaken impacts on where people shop.  Others that 'plan' where they shop according to where bargains are – buy bulk.	Do you worry about going food shopping (regularly)?  Do you plan where you will shop and what you will buy before you go?  Are you able to go to the shops when you want to?
<b>Coping Strategy</b>		
<b>Support Networks</b>	Families rely on extended family and friends networks for support and 'fill the gaps'	Tell me more about the support you have when you are having difficulties?  Do you think you rely on this support network?  Where would you go if you didn't have this support network?



**Appendix 6.1: Stage 3 Household Food Security Study Pilot Consent form.**

**Household Food Security Study Stage 3 Participant Consent form**

**CONSENT FORM**

I understand that I can say ‘**NO**’ to participate in this study

Please complete a new consent form for each child

<b>ID</b>	-
-----------	---

**Child Care Centre Name** \_\_\_\_\_

**CHILD’S NAME** \_\_\_\_\_

<b>DATE OF BIRTH</b>	<table border="1"><tr><td>/</td><td>/</td></tr><tr><td>day</td><td>month year</td></tr></table>	/	/	day	month year
/	/				
day	month year				

**SEX:** ☐ **Male** ☐ **Female**

I have read the Information pack ☐ Yes ☐ No

My child is aged between 6 months and 4 years. ☐ Yes ☐ No

We have been living in Darwin or Palmerston for a year or more. ☐ Yes ☐ No

My child has a medical condition that requires food or nutrition supplements. ☐ Yes ☐ No

**I understand that if I agree to have my child take part in this research study:**

- I can withdraw from the study at any time, without giving a reason
- I agree to have my child's height or length measured
- I agree to have my child's weight measured
- I agree to have my child's haemoglobin measured (using non-invasive methods)
- I agree to complete questionnaires about my living situation, wellbeing, food access, storage, preparation and cooking.
- I understand if selected, I will be invited to participate in a smaller group to test the USDA 18 item Household Food Security Module.
- I understand my name, or my child's name will not be identified in any reports or publications

**“Any information I provide about knowledge and cultural heritage that is specific to myself and family is owned by me. This will be acknowledged in the study's findings and reports or information about the study that is publicly distributed”.**

Parent or Guardian's

Signature\_\_\_\_\_

Parent or Guardian's

Name\_\_\_\_\_

Relationship to child\_\_\_\_\_

Date\_\_\_\_\_

Day Phone Number\_\_\_\_\_

Email address  
\_\_\_\_\_

Complaints and concerns must be directed to the Human Research Ethics Secretary on (08)89227922 or [ethics@menzies.edu.au](mailto:ethics@menzies.edu.au).

## **Appendix 6.2: Household Food Security Study Pilot Questionnaire**

### **Part 1 - Household Food Security Assessment- (mUS 18-item Module)**

**(Modified from USDA 18-item Household Food Security Module, USDA 1995)**

Please answer these questions within the past year from the date the questionnaire is undertaken. Place a √ in the box of choice

1. In the past year, have you ever worried about whether food would run out before you had enough money to buy more?

☐ Yes    ☐ No

2. In the past year, were there times the food you bought did not last until the next pay day and you did not have any money to buy more?

☐ Yes    ☐ No

3. In the past year, were there times you could not afford to buy healthy foods to eat at each meal?

☐ Yes    ☐ No

4. In the past year, were there times you had to rely on a few kinds of low-cost foods to feed the children because you were running out of money?

☐ Yes    ☐ No

5. In the past year, did you or other adults have to reduce the size of your meals or miss meals because there was not enough money for food?

☐ Yes    ☐ No

6. If yes, how often did this happen in the past year?

☐ Almost every month    ☐ Some months but not every month

☐ Only 1 or 2 months

7. In the past year, were there times you could not feed the children healthy foods at each meal because you could not afford to buy healthy foods?

☐ Yes    ☐ No

8. In the past year, were there times you had to eat less than what you felt you should because there was not enough money to buy food?

☐ Yes    ☐ No

9. In the past year, were there times the children were not eating enough food because you could not give them any more before running out?

☐ Yes    ☐ No

10. In the past year, were you ever hungry but did not eat because there was not enough food and you would run out?

☐ Yes    ☐ No

11. In the past year, did you lose weight because you did not have enough money for food?

☐ Yes    ☐ No

12. In the past year, was the size of your children's meals made smaller because there was not enough money for food?

☐ Yes    ☐ No

13. In the past year, did you or other adults ever not eat for a whole day because there was not enough money for food?

☐ Yes    ☐ No

14. If yes, how often did this happen?

☐ Almost every month    ☐ Some months but not every month

☐ Only 1 or 2 months

15. In the past year, were your children ever hungry but you could not give them any more food because you would run out?

☐ Yes    ☐ No

16. In the past year, did your children ever miss meals because there was not enough money for food?

☐ Yes    ☐ No

17. If yes, how often did this happen?

☐ Almost every month    ☐ Some months but not every month

☐ Only 1 or 2 months

18. In the past year, did your children ever not eat for a whole day because there was not enough money for food?

☐ Yes    ☐ No

**The following questions are to find out if your family did experience problems with having enough food and how you overcame them.**

19. In the past year, did your family have problems with having enough food?

☐ Yes    ☐ No **(Please go to Part 2)**

**If you've answered yes, please complete questions 20, 21 and 22**

20. How often did this happen?

☐ Almost every month    ☐ Some months but not every month

☐ Only 1 or 2 months    ☐ Don't know

21. What were the reasons you had problems with having enough food?

☐ Expenses (bills) to be paid    ☐ Not enough money

☐ Needed money for special occasion    ☐ Don't know

☐ other\_\_\_\_\_

22. If you needed to seek assistance to feed your family, where did you go?

(Choose as many options that apply)

☐ Family    ☐ Friends    ☐ Government services (ie. Centrelink)

☐ Charity organisations (i.e. Salvation Army)

☐ Don't Know    ☐ Other\_\_\_\_\_

**Scoring of the food security scale: mUS 18-item Module**

<b>Food security level</b>	<b>Number of affirmative responses 18-item, households with children</b>	<b>Total score (completed by researcher)</b>
Food-secure	0 – 2	
Food-insecure	3-7	
Low food security	8-12	
Very low food security	13-18	



## Part 2 - Social Determinants

Where indicated, please place a ✓ in the box of choice

### SECTION 1 – *Parent/ Carers demographic details*

1. Were you born in Australia? ☐ Yes ☐ No
2. If no, what year did you first arrive in Australia to live for a year or more?  
  
☐☐☐☐
3. Did you arrive in Australia as a refugee? ☐ Yes ☐ No
4. Are you Aboriginal or Torres Strait Islander? ☐ Yes ☐ No
5. What is your relationship to the child?  
  
☐ Mother ☐ Father ☐ Grandmother ☐ Grandfather  
  
☐ Aunty ☐ Uncle ☐ Foster carer  
  
☐ Other.....
6. What is your date of birth? (i.e. 04/07/1981) ☐☐/☐☐/☐☐

7. Within the last 4 weeks

- a. What was the total number of people living in the house?
- b. How many people living in the house were within the following age groups (Please complete all boxes. Indicate with **00** if age group not represented)

6 to 23 months       2 to 4 years       5 to 10 years

11 to 14 years       15+ years

**SECTION 2 – *Educational and employment details***

8. Which of the following describes the **highest qualification** or **level of education** you have completed?

- |   |   |
|---|---|
| <input type="checkbox"/> Never attended school    | <input type="checkbox"/> Trade/apprenticeship     |
| <input type="checkbox"/> No formal qualifications | <input type="checkbox"/> Certificate/ Diploma     |
| <input type="checkbox"/> Primary School           | <input type="checkbox"/> University degree        |
| <input type="checkbox"/> Year 10 or equivalent    | <input type="checkbox"/> Higher University degree |
| <input type="checkbox"/> Year 11 or equivalent    | <input type="checkbox"/> Don't know               |

☐ Year 12 or equivalent

9. Which of the following best describes your employment status? **Please select as many options applicable to you**

Work:     ☐ Full-time   ☐ Part-time   ☐ Casual

Student:   ☐ Full-time   ☐ Part-time

Home duties ☐                      Retired ☐                      Other ☐ .....

### **SECTION 3 – *Income details***

10. What is your estimated Household NET (after tax) fortnightly income?

☐ \$0 - \$399            ☐ \$800 - \$1,199            ☐ \$2,000 - \$2,399

☐ \$400 - \$799            ☐ \$1,200 - \$1,599            ☐ \$2,400 – above

11. What is the Household's main source of income? **Please select options applicable to you**

☐ Wages or salary (including from own incorporated business)

☐ Profit or loss from own unincorporated business or share in a partnership

☐ Dividends or interest                      ☐ Any Government pension or allowance

☐ Child support or maintenance

☐ Superannuation or Annuity (non-Government pension or allowance)

☐ Workers' Compensation              ☐ Other.....

12. What pay period does that cover?

☐ Week                      ☐ Fortnight                      ☐ Other.....

13. Can you estimate how much of the Household's income is spent on food?

☐ Quarter or less                      ☐ At least half                      ☐ More than half.....

#### **SECTION 4 – *Household details***

14. Does your home have a stove, oven or other cooking facilities in good working order?

☐ Yes                      ☐ No

15. Does your home have benches in good working order? (sealed, waterproofed, not falling apart)

☐ Yes      ☐ No

16. Does your home have kitchen cupboards in good working order? (doors, waterproofed, resistant to rot and pests, above bench height)

☐ Yes      ☐ No

17. Does your home have a refrigerator in good working order? (sealed doors, good temperature control)

☐ Yes      ☐ No

### **SECTION 5 – *Food and Transportation***

18. Where are the places that you usually shop for food? Select all options applicable to you.

☐ Supermarket (Coles, Woolworths)      ☐ Corner/ local shop

☐ Bakery      ☐ Fish and seafood outlet      ☐ Butchers

☐ Takeaway/ fast food outlets      ☐ Food markets & road side food stalls

☐ Other.....

19. What are the reasons you shop at this/ these places? Select all options applicable to you.

☐ Where want to shop

☐ Transport problems

☐ Illness

☐ Other

20. What forms of transport do you usually use to access food outlets? Select all options applicable to you

☐ Bus

☐ Bicycle

☐ Car

☐ Walk

☐ Taxi

☐ Motorcycle

☐ Walk

☐ Taxi

☐ Motorcycle

### Part 3 - Kessler 10 Psychological Distress Scale

The following ten (10) questions ask you about how you have been feeling in the **last four weeks**. For each question, place a  $\sqrt{\quad}$  under the option that best describes the amount of time you felt that way.

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
1. In the last four weeks, about how often did you feel tired out for no good reason?					
2. In the last four weeks, about how often did you feel nervous?					
3. In the last four weeks, about how often did you feel so nervous that nothing could calm you down?					
4. In the last four weeks, about how often did you feel hopeless?					
5. In the last four weeks, about how often did you feel restless or fidgety?					
6. In the last four weeks, about how often did you feel so restless you could not sit still?					

7. In the last four weeks, about how often did you feel depressed?					
8. In the last four weeks, about how often did you feel that everything was an effort?					
9. In the last four weeks, about how often did you feel so sad that nothing could cheer you up?					
10. In the last four weeks, about how often did you feel worthless?					

### Scoring framework for Kessler 10 Psychological Distress Scale

Score for each question		Overall score Psychological Distress rating	
Question response	Score	Overall rating	Score
None of the time	1	Low	10 - 15
A little of the time	2	Moderate	16 - 21
Some of the time	3	High	22 - 29
Most of the time	4	Very High	30 - 50
All of the time	5		



## **Appendix 6.3: Pilot Feedback Survey**

### **Household Food Security Study Pilot Feedback Survey**

#### **Family information booklet and questionnaire**

Thank you for participating in the Household Food Security Pilot study. We ask that you take a few minutes to complete this brief survey to provide us with important feedback on what your experiences were with the study information booklet and questionnaire. Presented below are statements, please circle the response (Yes or No) that best describes your experience.

#### **Household Food Security Study Family information booklet**

1. I liked how the booklet is presented (colours, words reasonable size, graphics)

Yes                      No

2. The information is easy to follow and understand

Yes                      No

3. All that I needed to know about the study is provided

Yes                      No



### **Household Food Security study Questionnaire**

1. Questionnaire is presented in a format that is easy to read and follow

Yes                      No

2. The questions are easy to understand and answer

Yes                      No

3. I liked the questions

Yes                      No

**Please include any additional comments here:**

Thank you for participating in this Pilot study. Your involvement is very much appreciated.

## **Appendix 6.4: Adjustments made to Household Food Security Study Questionnaire for Stage 3**

### **Part 1: mUS 18-item Module**

Questions 1 to 18: This is the mUS 18-item Module. Therefore, order and structure of questions required to remain as is. No requirements to adjust the wording (not the meaning) for interpretative reasons as had occurred in pre-Stage 1 implementation.

Feedback suggested changing the order of questions 20 to 22 for flow of questioning:

#### **Pilot questionnaire**

##### ***Q.20: How often did this happen?***

Response options: Almost every month; Some months, but not every month; Only 1 or 2 months; and Don't know

##### ***Q.21: What were the reasons you had problems with having enough food?***

Response options: Expenses (bills) to be paid; Not enough money; Needed money for special occasion; Don't know; and Other

##### ***Q.22: If you needed to seek assistance to feed your family, where did you go?***

Response options: Family; Friends; Government services (i.e. Centrelink); Charity organisations (i.e. Salvation Army); Don't know; and Other

**Adjusted to:**

*Q20: What were the reasons you had problems with having enough food?*

*Response options as above*

*Q21: If you needed to seek assistance to feed your family, where did you go?*

*Response options as above*

*Q22: How often did this happen? Response options as above*

**Part 2: Social Determinants:** No adjustments required

### **Part 3: Kessler 10 Wellbeing Scale**

The K10 is a tested and widely used tool internationally and within Australia. Like the USDA 18-item Household Food Security Module, the order and structure of questions are to remain unchanged. Pilot feedback indicated no concerns with this tool.

## **Appendix 6.5: Study procedures for undertaking Child Health Measurements**

### **Procedures for undertaking selected child anthropometric measurements**

**Source:** Commonwealth of Australia (2001). *Standard methods for the collection and collation of anthropometric data in children* Sourced from The measurement protocol as described by the World Health Organization (WHO Expert Committee 1995).

**For all measurements, children are to be dressed in light clothing and footwear removed. Nappies may remain on small children. For height and length measurements, remove hats and hair accessories where interfere with measurements.**

#### **Weight** (kg).

**Stand on Scales:** Weight taken to the nearest 0.1kg. Portable and battery operated Tanita Digital Stand on Scale (200kg/100g). Used with children able to stand without assistance.

- Operate scale as per instruction manual.
- Once ready, ask child to step onto the scale, stand over the centre of the scale with body weight evenly distributed between both feet. Ask the child to stand tall, look straight ahead and don't move.
- Record reading. Where necessary, second reading may be required.

**Supine (infant) weight Scales:** Weight is measured to the nearest 2 decimal places (0.00)kg. Infant Tanita 1583 Digital scale (20kg weighing capacity and reads to 20g)

- Operate scale as per instruction manual.

- Once ready, place baby on scale and ensure no limbs are overhanging.
- Try to keep the baby as still as possible until a reading is obtained.
- Record reading. Where necessary, second reading may be required.

**Obtaining weight measurement in event child or baby is restless (children 2 years of age and under)**

- Using stand on scales, weigh research team member and record weight
- Hold child, step onto scale and record weight
- Subtract research team member's weight from combined research team member and child's weight recording. Now have child's weight

**Height:** (cm)

**Seca portable height measure:** Height is measured to the nearest 0.1cm and for children who are 2 years of age or more.

- Set up measuring device as per instructions manual ensuring on a hard flat surface.
- Ask child to step onto the standing board with weight distributed evenly on both feet, heels together and the head positioned so that the child is looking straight ahead (line of vision is at right angles to the body). The arms are hang by the sides of the body.
- Next, ensure the child is standing up straight (not slouching) with their head, back, buttocks and heels in contact with the vertical board.
- Move the moveable measure onto the top of the head with sufficient pressure to compress the hair.
- Record the measurement on the data collection form

**Length** (cm)

**Seca 210 baby length measuring mat, portable light weight rubber with 10 – 99cm measuring range.** Supine length is measured to the nearest 0.1cm and is undertaken in children 2 years of age and under. Two members of the research team are required to undertake this measurement.

- Ensure the mat is fully extended (not stretched) on a flat surface and is ‘safe, no immediate danger to the child (i.e. rolling off and hurting themselves).
- Prepare the mat for use as per instructions manual and use water to dampen a clean cloth to wipe the surface for cleanliness and visibility of measurements.
- Place the child (on their back) on the mat. One team member positions the head where the crown of the head touches the vertical headboard. Gently hold the child’s head with line of vision is aligned at a 90 degree angle to the mat.
- The second team member ensures the child’s shoulders and buttocks are flat against the mat; shoulders and hips aligned at right angles to the body; and legs extended at the hips and knees. Arms rest against the sides of the body.
- The second team member takes the measurement by shifting the movable board against the child’s heels. Ensure the legs remain flat on the mat. This can be difficult when measuring infants. Therefore, extend one leg to obtain a measurement.
- Record the measurement on the data collection form.



## **Procedures for obtaining non-invasive transcutaneous Haemoglobin readings from children using Masimo Rainbow Radical 7 and 57**

The Masimo Rainbow Radical equipment is primarily designed to obtain oxygen saturation levels within a clinical setting. However, also have the capability of obtaining non-invasive transcutaneous haemoglobin readings through a probe placed on a finger. Personal communication with other Menzies Project staff, suggest to also use the big toe in small children (infants to 2 years of age) to obtain a reading. For purposes of this study, the Masimo Rainbow Radical 7 and 57 are used to obtain a non-invasive transcutaneous haemoglobin reading. These instruments are used as a screening tool only and are not diagnostic in determining anaemia status. Both instruments are easy to use.

1. Prior to use read the user's operations manual and ensure all required devices are included, the machine has a power supply and is working as per user's manual.
2. Once operational, as per user's manual connect the patient cable to the unit with the logos lining up; make sure it is a firm connection.
3. Choose sensor site. In order of preference choose:
  - middle and ring finger of the non-dominant hand,
  - middle and ring finger of the dominant hand,
  - index finger of non-dominant hand,
  - index finger of the dominant hand.
  - Avoid placing the sensor on the pinkie or thumb.
  - Use big toe on babies if unable to get a good reading on fingers.

4. Ensure sensor site is cleaned with an isopropyl solution or the hands are washed with soap, rinsed and dried thoroughly. To obtain a good reading, select a finger that has a good blood supply and the child's hand is warm.
5. Ensure Child SpHb probe is secured to patient connector. Place the probe on the finger with the sensor positioned in the centre of the nail. For reusable sensors, ensure the fingertip just touches the rubber stopper at the end of the sensor (not going over it) and sits parallel with the finger, not at an angle.
6. Rest child's hand with sensor on a horizontal surface (hand not hanging)
7. Ensure the child remains still throughout the reading, as movement will affect the reading. Wait at least 30 seconds for the machine to commence reading. To obtain a good reading, ensure the perfusion index is  $\geq 3$ .
8. If perfusion index is  $\leq 3$ , remove probe and gently rub child's finger to try to increase perfusion. Reattach sensor.
9. If perfusion index is  $\geq 3$  and low SpHb reading, repeat Steps 2 to 6.
10. To obtain a reading from younger children, it is usually easier for the child to be asleep and the probe placed on either a finger or big toe to obtain a reading.
11. Once a reading is obtained, record the result on the data collection form. Make a note if perfusion is low.
12. Wipe the probe with clear water (or isopropyl solution) after each child.

**Please note:**

- Nail varnish or other substances on fingernails can affect the perfusion index and machines ability to provide a reading. Nail length (particularly long nails) can also affect the ability to fit the probe on the finger as per instruction manual.
- A well lit room can also interfere with the reading. Place provided light shields over sensor to block ambient light.
- Be prepared with books and other quiet entertainment to distract children from the activity and to remain as motionless as possible.
- Make sure the user's manual is available to assist with any problem solving.

**Use of disposable sensor attachments:**

- Align red line from front to back to ensure proper positioning. If red lines don't line up AND there is any gap present at the finger tip, choose a smaller sensor.
- Ensure the sensor is not too tight or loose. If necessary, secure sensor in place with tape provided.

**Appendix 6.6: Household Food Security Study Pilot Child Health  
Measurements Data Collection and Feedback Forms**

**HOUSEHOLD FOOD SECURITY STUDY PILOT  
CHILD HEALTH MEASUREMENTS DATA COLLECTION FORM**

**Researcher Use Only**

**ID:**

		-			
--	--	---	--	--	--

**Child Care Centre Name:** \_\_\_\_\_

**Child's Name:** \_\_\_\_\_

**Date:**

		/			/				
--	--	---	--	--	---	--	--	--	--

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## Child Health Measurements

Length/ Height

.  cm

Weight

.   kg

Haemoglobin level

.  g/L

Comments

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Examiner: \_\_\_\_\_

**HOUSEHOLD FOOD SECURITY STUDY PILOT**  
**CHILD HEALTH FEEDBACK FORM**

Your child \_\_\_\_\_ was seen today \_\_\_\_/\_\_\_\_/\_\_\_\_ by the

‘Household Food Security’ research team.

**During the visit the following measurements were taken:**

Length/ Height                         .  cm

Weight                                         .  kg

Haemoglobin level (Hb)                        .  g/L

If your child’s Hb is < 11.0g/L it is recommended that you see your doctor.

Please    contact    Leisa    McCarthy    on    89227772/    89228196    or  
[leisa.mccarthy@menzies.edu.au](mailto:leisa.mccarthy@menzies.edu.au) if you have further questions regarding this letter.

**We thank you again for your participation!**

## Appendix 6.7: Household Food Security Study Stage 3 Rollout Consent form

ID -----\-----

### CONSENT FORM

I understand that I can say 'NO' to participate in this study

**CHILD'S NAME** \_\_\_\_\_

**DATE OF BIRTH**

    /    /  
day month year

**Child Care Centre Name** \_\_\_\_\_

**SEX:**    ☐ **Male**        ☐ **Female**

I have read the Information pack.

☐ Yes        ☐ No

My child is aged between 6 months and 4 years.

☐ Yes        ☐ No

We have been living in Darwin or Palmerston for a year or more.

☐ Yes        ☐ No

My child does not have a health problem where they receive food or nutrition supplements.

☐ Yes        ☐ No

**I understand that if I agree to have my child take part in this research study:**

- I can withdraw from the study at any time, without giving a reason
- I agree to have my child's height or length measured
- I agree to have my child's weight measured
- I agree to have my child's haemoglobin measured (using non-invasive methods)
- I agree to complete questionnaires about my living situation, wellbeing, food access, storage, preparation and cooking.
- I understand if selected, I will be invited to participate in a smaller group to test the mUS 18-item Module
- I understand my name, or my child's name will not be identified in any reports or publications

**“Any information I provide about knowledge and cultural heritage that is specific to myself and family is owned by me. This will be acknowledged in the study's findings and reports or information about the study that is publicly distributed”.**

Parent or Guardian's

Signature\_\_\_\_\_

Relationship to child\_\_\_\_\_

Day Phone Number\_\_\_\_\_

Parent or Guardian's

Name\_\_\_\_\_

Date\_\_\_\_\_

Email address  
\_\_\_\_\_

Complaints and concerns must be directed to the Human Research Ethics Secretary  
on (08)89227922 or [ethics@menzies.edu.au](mailto:ethics@menzies.edu.au).



**Appendix 6.8: Household Food Security Study Stage 3 Child Health  
Measurements Data Collection Forms**

**HOUSEHOLD FOOD SECURITY STUDY CHILD HEALTH MEASUREMENTS  
DATA COLLECTION FORM**

**Researcher Use Only**

**STUDY ID:**

--	--	--	--	--

**Child Care Centre Name:** \_\_\_\_\_

**Child's Name:** \_\_\_\_\_

**Date:**

		/			/				
--	--	---	--	--	---	--	--	--	--

## Child Health Measurements

Length/ Height

.  cm

Weight

.  kg

Haemoglobin level

.  g/L

Comments

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Examiner: \_\_\_\_\_

**HOUSEHOLD FOOD SECURITY STUDY CHILD HEALTH FEEDBACK  
FORM**

Your child \_\_\_\_\_ was seen today \_\_\_\_/\_\_\_\_/\_\_\_\_ by the

‘Household Food Security’ research team.

**During the visit the following measurements were taken:**

Length/ Height

.  cm

Weight

.  kg

Haemoglobin (Hb) level

g/L

Please note, the machine used to measure Hb levels is taking a reading for a particular point in time (similar to a screen). It is NOT used to diagnose anaemia. Therefore, if your child's Hb level is less than 110g/L, as a precautionary measure we recommend a visit to your doctor to have the Hb levels rechecked.

Please contact Leisa McCarthy on the below numbers if you have further questions regarding this letter.

0415768404

(08) 89228196

We thank you again for your participation!

