



Government of **Western Australia**  
Department of **Health**

# Food Access and Cost Survey (FACS)

## Western Australia, 2010

Prepared by:  
Tim Landrigan<sup>1</sup> and Dr Christina Pollard<sup>2</sup>

<sup>1</sup> Australian Bureau of Statistics

<sup>2</sup> Department of Health, Western Australia





## Message from the Environmental Health Directorate

A healthy food environment is essential to protect individuals and communities from diseases and other public health risks. The affordability and quality of food has the potential to influence consumer food choices and consequently their health. The term 'food security' refers to the availability of healthy, affordable foods and the capacity of individuals and communities to obtain them.

Ensuring that a safe, nutritious, affordable food supply is available to all is a challenge, particularly in the geographically remote areas of Western Australia.

The Department of Health's Food Unit coordinated the first ever West Australian Food Access and Cost Survey (FACS), specifically focusing on the pricing and quality of foods available from the main food grocery stores throughout the state, including Aboriginal community stores. This methodology ensures that these results are representative of food costs throughout the state.

The Western Australian demonstrates the feasibility of a nationally harmonised food costing and access survey.

A large team of public health practitioners, environmental health officers and public health nutritionists conducted the survey in July and August of 2010. This report is intended as a User's Guide, describing the survey design and implementation in presenting key results.

The Department of Health in Western Australia has endorsed the Food Access and Cost Survey (FACS) and the release of this report.

There is concerning disparity in food costs and quality throughout Western Australia. I urge readers to consider the implications of these findings and look for ways to create efficiencies in the food supply chain to make healthy food affordable to all Western Australians.

It is intended that this information assists retailers, food industry, policymakers, health, education and welfare professionals, and the general community to improve food security.



Jim Dodds

Director Environmental Health



**Contact Details for further information:**

**Dr Christina Pollard**

Nutrition Policy Advisor  
Public Health Division  
Department of Health in Western Australia  
PO Box 8172, Perth Business Centre, WA 6849  
Email: [Christina.Pollard@health.wa.gov.au](mailto:Christina.Pollard@health.wa.gov.au)

## Acknowledgements

FACS gratefully acknowledges the funding provided by Population Health Policy Unit to conduct the research. Thanks are also extended to Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) who provided supplementary funding for additional analysis.

The contributions of the following are also acknowledged: advisors from Australian Bureau of Statistics, Food Standards Australia and New Zealand, Curtin University, and all those who assisted with survey design.

We also thank all of the surveyors including, those Environmental Health Officers and others from local government, staff from Country Health Services (mostly public health nutritionists), tertiary students who were on placement and were coopted to assist, the DoHWA Food Unit, Tobacco Control Area, Science and Policy Unit, and Curtin University School of Public Health. Thank you to Shannon Carter from the Epidemiology Branch of DoHWA for the geo-coding and mapping of the supermarket locations.

We thank Melanie Voevodin for providing additional information on menus and the quantities of foods priced to compile the total cost of the seven-day meal plan for the welfare families.

Particular thanks go to all the retail grocery store staff and management for their assistance and support for the project.

## The Food Access and Cost Survey Project Team

The FACS was conducted as part of the DoHWA Environmental Health's Food Unit (FU) monitoring program in collaboration with the Science and Policy Unit (SPU) with funding from Public Health Policy Unit (PHPU). The FACS project team conceived, managed the implementation and analysis and prepared the report.

## The Food Access and Cost Survey Project Team

Name	Title & Organisation
Dr Christina Pollard	Nutrition Policy Advisor, Food Unit, Environmental Health Directorate, Public Health Division, Department of Health, Western Australia
Pernilla Ellies	Senior Scientific Officer, Science & Policy Unit, Environmental Health Directorate, Public Health Division, Department of Health, Western Australia
Tim Landrigan	Australian Bureau of Statistics, Outposted Officer, Department of Health, Western Australia
Matthew Lester	Manager Aboriginal Environmental Health, Environmental Health Directorate, Public Health Division, Department of Health, Western Australia
Ass Prof Deborah Kerr	School of Public Health, Curtin University Western Australia
Joanna Whiteford	School of Public Health, Curtin University Curtin University
Stanley Goodchild	Manager, Food Unit, Environmental Health Directorate, Public Health Division, Department of Health, Western Australia

## Table of Contents

Table of Contents .....	6
List of boxes.....	8
List of figures .....	8
List of tables.....	8
Abbreviations .....	10
Executive summary.....	11
Key findings .....	11
Grocery stores location in Western Australia is associated with population density .....	11
Energy density foods are cheaper than less energy dense foods .....	11
Food costs substantially more in remote areas of Western Australia .....	11
Welfare recipients spend a greater proportion of their income on food .....	12
Access to fresh, good quality food is limited by where people live .....	12
Conclusion .....	12
Recommendations.....	12
1. Introduction .....	13
1.1 About this report .....	13
1.2 Study aims .....	13
1.3 Broad aim .....	13
1.4 Specific Objectives.....	13
1.5 Research and literature review .....	14
2. Food Access and Cost Survey .....	16
2.1 Obtaining supermarket pricing information .....	16
2.2 Approach to selecting foods.....	16
2.3 Consistency with existing surveys –healthy basket.....	17
2.3 Sources of foods.....	17
Best sellers, heavily marketed and promoted foods .....	17
Multiple brands to obtain average pricing .....	18
2.4 Stakeholder Feedback.....	19
2.5 Quality assessment tool.....	19
Fresh fruit and vegetable quality.....	20
Fresh meat quality .....	20
Additional information .....	21
2.6 Survey collection instrument.....	21



Pilot testing of instrument .....	21
2.7 Limitations of the survey .....	22
3. Sampling .....	23
3.1 Sampling overview .....	23
3.2 Stratification .....	23
3.3 Sample methodology .....	26
Selection unit .....	26
Sample size and sample allocation .....	26
3.4 Sample selection .....	27
Selection of SLAs .....	27
Selection of supermarkets .....	27
Remote Indigenous community stores .....	27
4. Data collection .....	28
4.1 Data collection timeframe .....	28
4.2 Data collectors .....	29
4.3 Training material .....	29
Survey instructions .....	30
Training for data collectors .....	30
Training presentations .....	30
Effectiveness of training .....	30
Data entry .....	31
5. Data analysis .....	31
5.1 Data for analysis .....	31
Average prices of foods .....	31
Nutrition information and food group classification .....	31
SLA data .....	31
Distance from Perth .....	32
Income data .....	32
Quality of fruit, vegetables and meats .....	32
5.2 Market baskets .....	32
Queensland Healthy Food Access Basket .....	32
Northern Territory Market Basket .....	33
Healthy Food Basket affordability by welfare recipients .....	33
Other analysis .....	33
6. Results .....	33



6.1 Response rate .....	33
6.2 Cost of food by geographical location .....	34
Cost of a Healthy Food Access Basket .....	34
Healthy food basket using Northern Territory Market Basket .....	35
Comparison of the baskets .....	36
6.3 Affordability of food by geographic location .....	37
6.4 Availability of the foods .....	37
6.5 Energy density and food costs .....	43
6.6 Quality of fruit, vegetables and meats .....	43
6.7 Top 25 Best Selling foods .....	44
7. Recommendations .....	44
References .....	46
Appendices .....	48
Appendix 1: Milestones and key dates .....	48
Appendix 2: Stakeholder group .....	49
Appendix 3: Literature review .....	50

#### List of boxes

Box A: Recommendations for foods and survey instrument .....	22
Box B: The potential for future research projects on processed food .....	22
Box C: Data collection recommendations for FACS .....	29
Box D: Training recommendations for FACS .....	31

#### List of figures

Figure 1: Supermarket locations, WA .....	24
Figure 2: Supermarket locations, Perth metropolitan area .....	25
Figure 3: Mean cost of HFAB basic food groups by remoteness, WA .....	35
Figure 4: Mean cost of NT basket food groups by remoteness, WA .....	35
Figure 5: Comparison of Queensland HFAB and NT market basket .....	37

#### List of tables

Table 1: Australian Market Basket Surveys: Objectives, Timing and Coverage .....	15
Table 2: Top selling breakfast cereals and lunch box snacks, source Choice website .....	18
Table 3: WA SLAs and supermarkets by Remoteness Area and SEIFA .....	26
Table 4: Sample allocation .....	27
Table 5: Final number of SLAs and stores selected .....	28
Table 6: Distance category .....	32
Table 7: Mean cost of HFAB basic food groups by remoteness, WA .....	34





Table 8: Comparison of foods in HFAB, IHFB and NT MBS .....36

Table 9: Mean weekly cost of meal plan and income left after meal plan is purchased for couple family.....37

Table 10: Food availability by chain – number of stores where food item was not available.....38

Table 11: Mean quality score for produce by remoteness category .....44





## Abbreviations

ABS.....	Australian Bureau of Statistics
CPI.....	Consumer price index
DoHWA.....	Department of Health in Western Australia
FACS.....	Food Access and Cost Survey
FaHCSIA.....	Department of Families, Housing, Community Services and Indigenous Affairs
FSANZ.....	Food Standards Australia New Zealand
HFAB.....	Healthy Food Access Basket
IGA.....	Independent Grocers Alliance
IHFB.....	Illawarra Healthy Food Basket
MBS.....	Market basket survey
NTMB.....	Northern Territory Market Basket
RA.....	Remoteness area
SAS.....	Statistical Analysis System®
SEIFA.....	Socio-economic index for areas
SLA.....	Statistical local area

## Executive summary

Food has a direct influence on health and the prevention of non-communicable disease through improving nutrition is a public health priority. Consumption of nutritious, safe and appropriate foods leads to a well nourished and healthy society. Food security, the ability of individuals, households and communities to acquire appropriate and nutritious food on a regular and reliable basis using socially acceptable means, is determined by people's local 'food supply' and their capacity and resources to 'access and use that food'. The availability and affordability of food is a determinant of food choice.

The Food Access and Costs Survey (FACS) aimed to explore cost as a determinant of food choice in Western Australia (WA) and the feasibility for the development of a nationally harmonised system for monitoring food access and cost. The survey focused on the food supply aspect of food security, particularly cost, variety, quality and availability.

Prior to the FACS survey, little was known about the geographic location of grocery stores and the affordability and quality of food available in Western Australia. A representative sample of 160 grocery stores in Western Australia including all community stores was selected. The survey response rate was 90%. The Department of Health's Food Unit developed and managed the implementation of the survey in partnership with the Australian Bureau of Statistics and Curtin University.

Ninety seven individual surveyors implemented the surveys across the state, with the average time of 4.1 hours. Time varied according to the size of store and whether or not pricing labels were on food, and smaller stores took less time.

### Key findings

#### **Grocery stores location in Western Australia is associated with population density**

There were 447 grocery stores across WA at the time of the survey, 85 Coles, 84 Woolworths, 226 IGA and 52 community stores. The major chains, Coles and Woolworths are mainly located in population dense areas and capital cities. The IGA stores are the main providers of foods to regional and remote areas, however, in very remote areas of WA, people rely on one main grocery store, usually a community store.

#### **Energy density foods are cheaper than less energy dense foods**

Foods that are higher in kilojoules generally cost less than those that are not. There is a strong correlation between the cost of foods and their energy density. Generally, fats and oils, sugar and foods that are high in added fat and sugar were the cheapest. Perishable core foods (e.g. fruit, vegetables, meats and dairy foods) that are lower energy density and higher nutrient density cost more by weight than those of a higher energy density.

#### **Food costs substantially more in remote areas of Western Australia**

The cost of all food groups was significantly greater in very remote areas than in capital cities. The mean cost per fortnight for a healthy food basket in WA in August/September 2010 was \$542.19 to \$627.11 per fortnight. Remote communities would pay significantly more for a healthy food basket compared to the major cities. The cost of an average basket was 23.5 percent more expensive in very remote areas; some communities would pay up to \$709.04.

## **Welfare recipients spend a greater proportion of their income on food**

The proportion of weekly income that would be spent on food to purchase a food basket consistent with Australian Dietary recommendations was much greater for welfare recipients. Welfare recipients would need to allocate about half of their disposable income to food compared to only 16 percent for the average income earner.

## **Access to fresh, good quality food is limited by where people live**

As well as costing more, the range and quality of foods that were available decreased with distance from Perth. The quality of fresh foods (i.e. fresh meat, fruit and vegetables) was impacted by transport logistics. Fresh food is limited in its availability outside the metropolitan area. Meat was only available frozen in rural and remote areas and milk was only available in UHT or powdered forms in some remote communities.

Wheat biscuits, rolled oats, teabags, powdered and Ultra Heat Treated (UHT) long life full-cream milk, red apples, oranges, cabbage, carrots, tomatoes, potatoes, canned spaghetti, canned baked beans, canned tuna, canned peas, canola oil, white sugar, Milo®, strawberry jam, Coca-Cola Zero®, white rice, white flour, spaghetti, white sandwich bread sliced, strawberry jam, and pasta sauce were available in almost all stores. Many foods on the list were not available in community stores, particularly the healthier versions.

## **Conclusion**

People living in remote areas in WA are at a disadvantage when it comes to affordability and access to healthy food. Food pricing is associated with geographic location, with remote areas paying more for all foods. This increase is across all foods, however, greater for healthier foods.

Monitoring food prices for health purposes provides evidence to support intervention development aimed at increasing the promotion, sale and consumption of foods consistent with dietary recommendations. Further analysis is recommended to explore the cost of an optimum food basket, and the comparative cost of 'junk food' compared to core foods.

## **Recommendations**

The food pricing and quality survey is likely to be useful for nutrition promotion purposes, however further research, information and partnerships are required to achieve this end. In particular, negotiation with the grocery retail industry is required to identify how access and pricing influences the food choice in relation to the promotion, pricing and quality of foods.

Key recommendations include:

1. Conduct an annual WA Food Access and Pricing Survey
2. Develop a national routine food access and pricing survey to support policy initiatives to promote food security.
3. Formalise partnerships between government, food retail industry, and appropriate academic institutions to explore food access and pricing influences on health.
4. Negotiate to identify the top 25 best selling foods to inform the development of nutrition interventions.
5. Continue to develop and refine the objective assessment of quality and availability of fresh food at point of sale.
6. Develop and refine a series of food baskets to represent optimal and current consumption.

## 1. Introduction

### 1.1 About this report

This report focuses on the development and piloting of the Food Access and Cost Survey (FACS). The FACS is the result of the identified need to understand the role of cost as a determinant of food choice. This report outlines the development of the survey instruments, the methodology, and key findings and makes recommendations for food pricing monitoring for Western Australia.

Surveys of this type are best developed in partnership. The Department of Health and Western Australia's Food Unit, with funding from Population Health Policy Directorate, undertook the survey in partnership with Curtin University and the Australian Bureau of Statistics. Tim Landrigan, the Senior Outposted Officer from the ABS advised on the survey development and implementation, and conducted the analysis. These partnerships provided strategic advice and the benefit of real-world experience to the project team.

This report is intended to be a User's Guide to implementing food pricing surveys for health purposes and to guide the development of a nationally harmonised survey.

### 1.2 Study aims

Food security, the ability of individuals, households and communities to acquire appropriate and nutritious food on a regular and reliable basis using socially acceptable means, is determined by people's local 'food supply' and their capacity and resources to 'access and use that food'. The FACS focused on the food supply aspect of food security, particularly cost, variety, quality and availability.

### 1.3 Broad aim

The objective of this research was to explore cost as a determinant of food choice in Western Australia (WA) and the feasibility for the development of a nationally harmonised system for monitoring food access and cost.

### 1.4 Specific Objectives

The objectives of the FACS pilot in Western Australia were to:

1. Calculate the cost of a household basket of foods consistent with Australian Dietary Guidelines and to compare the cost and availability of this basket by geographic location, socio-economic status and remoteness.
2. Compare the quality and availability of fresh foods (i.e. fresh meat, fruit and vegetables) by geographic location and socio-economic status.
3. Calculate the energy density and energy cost relationship between foods.
4. Compare the weekly cost of a basket of food consistent with Australian Dietary Guidelines as a percentage of weekly income for a reference family.
5. Map the main grocery stores servicing the Western Australian community by socio-economic status and remoteness classification.
6. Identify the top 25 best selling foods.

## 1.5 Research and literature review

A review of contemporary Australian market basket surveys (MBS) was undertaken to identify the range of foods currently priced in food price monitoring surveys and their method of analysis. The aims, objectives and location of each of these surveys was identified, where possible the people who developed and implemented the surveys were contacted and structured interviews were conducted to identify the benefits and limitations of each survey. Those interviewed also gave recommendations for a nationally harmonised survey.

The ABS conducts some national pricing surveys to inform the *Consumer Price Index* – the *Household Expenditure Survey* (HES) and the *Average Retail Prices of Selected Items*. Although useful, the surveys are not designed for health purposes, and timing is an issue; the frequency of the HES is five yearly and the publication *Average Retail Prices of Selected Items, Eight Capital Cities* will be discontinued after the June quarter 2011 issue.

There are three main market basket surveys for health purposes that have been collected regularly, the Northern Territory Market Basket<sup>1</sup> (NTMB), the Queensland Healthy Food Access Basket<sup>2-3</sup> (HFAB) and the Illawarra Healthy Food Basket<sup>4-5</sup> (IHFB). Most other one-off surveys are based on these surveys. Australian pricing or market basket surveys that had been analysed and published in peer reviewed journals were reviewed to assist the survey methodology development. The surveys were developed to meet a variety of objectives and assess the cost of food for particular populations or subpopulation groups. Additional information was sought on actual quantities of foods priced and menus that were used for each survey type. Table 1 summarises the objectives, location and timing of the main Australian market basket surveys.

Separate surveys are conducted from time to time in most states or territories, however, there is no regular national survey to monitor and compare food cost, availability and quality in both metropolitan and regional areas. One study analysis compared the cost of a healthy food basket to the income of welfare dependant families<sup>6</sup>. Melanie Voevodin, provided additional information on the actual quantities of the foods priced and the menus that were used to compile the total cost of the seven-day meal plan for the reference families.

A review of the peer reviewed literature was undertaken to inform survey development using the search terms: pricing, food cost, food security, access, market basket surveys and quality of food.

**Table 1: Australian Market Basket Surveys: Objectives, Timing and Coverage**

Sponsoring agency	Title	Reference years	Coverage	Objectives
<b>Monitoring Surveys</b>				
Australian Bureau of Statistics	Consumer Price Index (CPI)	Quarterly	Eight capital cities	To measure quarterly changes in price of a fixed basket of goods and services in the eight capital cities. Food group index measures price changes of fresh food and groceries typically purchased by Australian households. There are no regional prices measures of CPI.
Northern Territory, Department of Health and Families	NT Market Basket (NTMB)	Annual since 1998	Territory wide (NT)	To monitor food cost, availability, variety and quality in remote Indigenous community stores in the NT. Collects community stores operations and nutrition policies information.
Northern Territory Government	Grocery Price Survey (GPS)	6 monthly Dec 2005	Territory wide (NT)	To monitor and publish grocery prices across the NT. The GPS measures the cost of purchasing an average basket of goods at each of the supermarkets included in the survey.
Queensland Health	Healthy Food Access Basket (HFAB)	1998, 2000, 2001, 2004, 2006	Queensland wide (QLD)	To assess changes in cost, availability and variety of basic food items and healthy food choices in urban, rural and remote areas of QLD.
Queensland Government	Index of Retail Prices in Regional Centres	1999, 2001, 2006	State wide (QLD)	To monitor regional retail prices of goods and services in selected QLD cities and towns. Index allows relative retail price comparison between selected centres and Brisbane average.
School of Health Sciences, University of Wollongong New South Wales (NSW)	Illawarra Healthy Food Basket (IHFB)	2000, 2001, 2003, 2005, 2007	Illawarra region (NSW)	To monitor the affordability of a basket of healthy food items in the Illawarra region of NSW. To assess trends in food affordability -- average income and social welfare benefits.
Deakin University (VIC)	Kettings et al.	2007	Metropolitan Melbourne (VIC)	To examine the cost of healthy food habits for welfare-dependent families in Australia.
<b>One off surveys/analysis</b>				
Monash University (VIC)	Victorian Healthy Food Basket (VHFB)	2007	Rural and regional Victoria (VIC)	To compare the cost of nutritious food with less healthy foods. To identify population sub-groups most vulnerable to economic food insecurity.
Sydney Food Fairness Alliance (SFFA) NSW	SFFA Market Basket Survey	2006	Metropolitan Sydney (NSW)	To determine food price and quality inequities across Sydney and likely food security impact for disadvantaged areas of Sydney.
Eat Well SA (SA)	The Food Supply in Rural SA Survey	2000	Rural SA (SA)	To investigate how cost, quality and variety of the food supply varies across rural SA
Flinders University (SA)	Adelaide Healthy Food Basket (AHFB)	2005	Metropolitan Adelaide (SA)	To compare the cost, availability, affordability of a standardised healthy food basket in 5 Adelaide local government areas by SES
Kimberley Public Health Unit, WA Health	WA Aboriginal Community Stores Survey (WAACSS)	2001	Community stores in remote (WA)	To investigate the cost of food in remote Aboriginal community stores.



## 2. Food Access and Cost Survey

### 2.1 Obtaining supermarket pricing information

It was anticipated that electronic pricing scanner data for specific food products over the survey period would be able to be obtained from the major supermarket chains in Western Australia. Both major supermarket chains were approached to request a summary of the price of a set list of food products sold over a set period, as well as information on the top 25 food bestsellers. Each chain was provided with the survey instrument and a request was made for the provision of pricing information. Following initial discussions with the national management of Coles and Woolworths, it was obvious the retail data we required would not be made available. Therefore, an alternative means of obtaining the data had to be considered. The independent grocery chain did not have the capacity to provide statewide information as each store is managed at a local level.

The use of Internet pricing data was also considered when developing the survey, however this was not feasible due to a number of issues. The supermarket chains informed us that online price information did not capture daily pricing discounts in store due to local pricing competition. The 'shop online' prices include a mark up for delivery that would affect food pricing and not all stores or suburbs are within the delivery. To obtain the data from the Internet, each store's food pricing would need to be accessed separately which would be a resource intensive exercise.

The discussions with the major supermarket chains and people who had previously conducted market basket surveys identified that food pricing was associated with the quality of product. Those who previously conducted assessment of quality of food indicated that this was a difficult task.

In the absence of electronic pricing information or using web-based data, the collection of FACS pricing information had to occur at the point of sale. This significantly increased the burden of the data collection and meant that a representative sample of the supermarkets needed to be determined. Collecting the pricing information at point-of-sale would however enable the collectors to assess the quality of the fresh fruit, vegetables, and meat offered for sale in supermarkets as they were collecting pricing information.

### 2.2 Approach to selecting foods

The foods included in the FACS were chosen based on:

1. Suitability for the development of a nationally harmonised system
2. The main drivers of the determinants of food choice at point-of-sale, including:
  - a. Consumer drivers –convenience, quality, health, proportion of income
  - b. Food marketing and promotional strategies –in-store and on packaging
  - c. Food industry drivers –health, environment, sustainability, generic branding
  - d. Market share –top selling brands from Nielson Convenience Report 2008
3. Public health policy drivers –consistency with National Health and Medical Research Council Australian dietary guideline recommendations <sup>4-6</sup>.
4. Geographic location –including remoteness.



## 2.3 Consistency with existing surveys –healthy basket

### *Healthy food access basket*

The survey was designed to assess the feasibility of a national harmonised food price monitoring survey. Three of the jurisdictions already had well established and ongoing existing Market Basket surveys conducted since the late 1990s; the NTMB, the QLD HFAB and the IHFB. In order to capture changes in trends of food pricing it was logical to review these three baskets and incorporate as many of the foods as possible for ongoing trend analysis and for comparison between jurisdictions. All of the foods that appeared in all three baskets were automatically incorporated into the FACS. Appendix 2 shows a list of all the foods collected in the three existing market baskets.

Existing baskets collect information on availability as well as price of ‘healthy’ foods. That is, foods that would be required to meet the nutritional requirements of a prescribed hypothetical family for a set period of time. Each basket included a selection of fruit, vegetables, lean meats and dairy products that were considered core foods that should be available to a community to ensure nutritional adequacy. This list was used to assess appropriateness of foods provided through community stores. The FACS incorporated all of these foods and additional foods reflecting dietary recommendations, for example, commonly purchased fresh fruit and vegetables (dietary variety), and key foods whose consumption within the general community is lower than optimum, such as legumes and wholegrain flours.

### *Meeting specific needs*

As many of the baskets had been developed almost two decades earlier to measure adequacy of foods for people on a low income or in remote Indigenous communities, there was a need to incorporate additional commonly eaten foods or foods that are recommended to be consumed on a ‘low but adequate’ income. Generic brands were included as a lower priced option. Foods that Indigenous communities prefer e.g. kangaroo tails, or have historically consumed e.g. tinned meat, and tinned oysters were also included.

Measuring availability of core foods requires that the food basket contains a minimum list of foods that the surveyor can check for availability against. It was the intention of the FACS to incorporate this.

## 2.3 Sources of foods

Unlike existing market basket surveys, the FACS was intended to assess food pricing as a determinant of dietary habits consistent with dietary guidelines. This meant that energy dense –nutrient poor foods that significantly contributed fat, sugar or salt to the Australian diet needed to be included. Best sellers, heavily marketed and promoted foods were identified and a selection was included in the instrument. This meant that we included top brands as well as top selling products.

### **Best sellers, heavily marketed and promoted foods**

#### *The Australian Consumer Association*

The Australian Consumer Association’s Choice magazine conducts surveys to expose deceptive conduct related to food labelling and information, or to advocate for better nutrition (particularly for children). Their recent supermarket price surveys were considered to identify foods of interest and survey methodology<sup>7</sup>. The Choice website contained information on top selling breakfast cereals<sup>8</sup> and children’s lunch box snacks<sup>9</sup> which were assessed by Choice to determine their nutritional value. The top five breakfast cereals and four lunch box snacks incorporated into the FACS basket and are listed in Table 2.

**Table 2: Top selling breakfast cereals and lunch box snacks, source Choice website**

Breakfast cereals	Proportion of overall breakfast	
	cereal sales %	Lunch box snacks
Sanitarium® Weet-Bix™	19.3	Uncle Toby's® Roll-Ups
Uncle Toby's® Plus	6.2	Kellogg's® LCMs Rice Bubbles
Kellogg's® Nutri-Grain®	5.7	Kellogg's® Nutri-Grain® Bars
Kellogg's® Corn Flakes	4.6	Nestlé® Milo Bars
Kellogg's® Sultana Bran	4.5	

*Leading food brands sold through grocery stores*

The top selling brands in the main food categories were selected using the Retails World's Australasian Grocery Guide 2009 which shows market share and sales by volume in Australia. Foods were selected from all of the 14 categories. Generic chain brands were included as potential lower-priced options. The Nielson Company collates and circulates (for a fee) top selling brands and foods. Free summaries are available via their website. The Nielson Grocery Report 2008, Convenience Report 2008 and the Nielsen Top Brands Report 2009 were consulted to identify foods that and brands that have a high market share in Australia<sup>10</sup>. Commonly purchased brands were identified. For example, when choosing fibre enriched bread, Tip Top Sunblest Up® and Wonder White Hi Fibre Plus® were selected as representing top selling brands and it was assumed that they would be widely available. In addition, foods from the leading food company brands such as Continental®, Uncle Toby's®, Arnott's®, McCain's®, etc. were chosen.

*Local brands*

Consumers are encouraged to buy local in order to reduce the food miles and promote sustainability. In line with government strategies to encourage purchasing of locally produced foods, perishable foods and brands produced in Western Australian, for example milk and bread, were chosen. It was assumed that for a nationally harmonised survey, local versions of these foods at each jurisdiction would be incorporated.

*Health and convenience*

Some foods that had the Heart Foundation Tick® were selected to determine the food cost implication, if any, of health product certification on food pricing. Top market share pre-prepared meals were also included to identify the cost of convenience to the consumer.

**Multiple brands to obtain average pricing**

To ensure that a common price was able to be determined for each food, the FACS includes multiple brands, including generic or house brands. The inclusion of at least three brands is common practice in ABS pricing survey methodology as it also increases the likelihood of at least one price being collected for that type of food in each store. For example there are four different brands of a 500g packet of dry spaghetti. In larger stores with a greater range of stock, it is anticipated each brand of spaghetti will be available so prices for all these brands will be collected. In a smaller store, only one brand of spaghetti may be available so only one price will be collected. This method also allows a measure of availability and variety to be obtained.

The final basket contains a list of approximately 430 items covering 190 different foods. The FACS basket was compiled using Microsoft Excel® with complete descriptions of each food, including brand and registered product name, variety and size to price. Food product descriptions were obtained through Coles Pty Ltd, Woolworths Pty Ltd and individual food

company websites so as to describe each food as accurately as possible to simplify price collection in the field. Appendix 4 contains the final instrument.

## **2.4 Stakeholder Feedback**

Expert advice was sought from government personnel working in the area of public health nutrition and food regulation who may be involved in market basket surveys, to develop the survey instrument and implementation methodology. The Advisory Group comprised of representatives from state and territory Health Departments, Food Standards Australia and New Zealand (FSANZ) and academics working in the area met via teleconference to assist the development of the survey instrument. Table 7 lists the Advisory Group Members.

After reviewing the FACS aims and objectives and draft survey instrument sent to stakeholders in May 2010, the group gave feedback on the objectives, instruments and survey logistics with a view to piloting the survey to determine suitability for national application. The telephone conference feedback was invaluable highlighting potential problems and suggestions for collecting prices. Key points identified were the need to ensure:

1. Comparison with existing regular market basket surveys was possible
2. Some national brands and products are included to enable collection and comparison in other jurisdiction for the nationally harmonised survey. Collecting prices for different brands of the same product allowed both local and national brands to be included.
3. Detailed descriptions of products. This would simplify price collection and ensure like products were being compared. Comprehensive descriptions of each item were included for price collectors with clear instruction on what to do if a product was not available.
4. Fresh fruit and vegetables were accurately described so that differences in variety and quality were taken into account. A comprehensive list of fresh fruit and vegetables was included, for example Fuji apples rather than just red apples, to ensure a greater range of prices is collected and to provide a measure of variety available.
5. Individual subjective assessment of quality was limited.

At the time of the teleconference the quality assessment method was not yet devised and members commented on the limitations of all current instruments and the overall difficulty of assessing quality.

The stakeholder feedback was taken into account and some revisions were made to the list of foods in the basket and their descriptions. Other suggestions from the Group were incorporated into the price collection methodology, data analysis, and subsequently developed quality assessment tool.

## **2.5 Quality assessment tool**

Price is related to quality, therefore an assessment of food quality was required when considering price as a determinant of food choice. Quality grading of fresh produce and meat products is a specialised area and has the potential to be subjective. The intention was to design a quality assessment tool consistent with industry standards that reflected pricing that reduced observer subjectivity and was relative quick to administer. Ideally quality grading is assigned in store and could be retrieved with bar-coded pricing information. At this time this method is not available for our purposes so an assessment tool needed to be developed.

Quality assessment measures used in previous market basket surveys were considered, and although different methods were used to rate the quality of fresh produce in-store, the basic

criteria used to define quality were similar. A set of indicators were developed with a yes or no response if the produce exhibited the specified indicators.

### **Fresh fruit and vegetable quality**

Numerous factors affect the quality of fresh fruit and vegetables relating to the supply chain management of produce, particularly transport, storage and handling. To maintain quality of fresh produce, correct handling and temperature during transport is important. For fruit and vegetables there are three main areas of concern: appropriate temperature and display facilities; presence or proximity to ethylene producing produce; and protecting from light to reduce spoilage for some vegetables.

Most quality assessment of fresh produce at point of display measure:

1. **Signs of ageing:** softness, discolouration, wilting, limpness, skin wrinkling
2. **Bruising:** bruising, breakage of skin, only portions of fruit edible
3. **Mould:** mould present, rotting, fruit inedible.

For fruit to be acceptable for purchase, some additional quality characteristics are considered:

Acceptable: peak condition, top quality, good colour, fresh, firm, clean

Unacceptable: bruised, old looking, mushy, dry, overripe, dark shrunken spots in irregular patches or cracked and broken surfaces, signs of mould or excessive softening

Fruit quality at point of supply is judged based on shape, colour, blush and maturity. Defects may include misshapen fruit, skin moulds, sunburn, hail damage and bruising.

The quality of fruit and vegetables may be described using three main attributes:

1. **Intact:** free of major injury and spoilage
2. **Sound:** not overripe, soft, wilted, free of foreign odours and foreign tastes, free of injury or blemish which is likely to affect keeping quality
3. **Clean:** free of dirt, dust, unacceptable chemical residues and other foreign matter

A visual assessment in store was necessary. Written descriptions of acceptable quality for 14 fruit and vegetables were provided and the surveyor had to decide whether or not that aspect was present or visible in 75% or more of the produce on display. Responses were simply a yes or no answer. The MarketFresh® website was consulted for descriptions and terms<sup>11</sup>.

Commonly available produce were considered for quality assessment, and those chosen were based on expected quality variations and those included in previous studies, including the RIST. The final selection of fruit and vegetables chosen for quality assessment was based on the time available to conduct a pricing, availability *and* quality survey at the point of sale. Appendix 3 contains the quality assessment tool and shows the produce and indicators used to determine quality.

### **Fresh meat quality**

The quality assessment tool for fresh meat, specifically for food security purposes was developed from scratch. Fresh meat quality was considered in three ways; the quality with respect to the consumption of the meat (suitability for cooking, eating and flavour); food safety and the nutritional quality of the meat (e.g. fat content).

AUS-MEAT Limited, is responsible for establishing and maintaining National Industry Standards for meat production and processing<sup>12</sup>. They have developed a language for domestic trade descriptions pertaining to meat and incorporate Meat Standards Australia meat

grading and labelling system. A set of indicators for meat quality were developed from these standards in consultation with Stan Goodchild, Manager of the Food Unit. The quality assessment tool aims to assess the storage, packaging and visual aspects of a subset of the meat. Descriptions and meat and fat colour charts were for 8 meats were developed to assist surveyors to quickly grade meat quality for FACS purposes. Responses were either a 'yes' or 'no' for each quality aspect present or visible in the meat surveyed. The complete quality assessment tool showing the meat assessed and the indicators used to determine quality is available in Appendix 3.

### **Additional information**

A series of additional information was collected to aid survey analysis and give information relating to food access, cost and quality, including the: number of checkouts –an indication of store size; date of last delivery of fresh foods; store name, date of survey and contact details of surveyor.

The survey instrument allowed for information to be collected on current price (with indication if the item was on sale) as well as usual price. Columns allowed alternative package sizes to be recorded if the one requested was not available. The instrument recorded foods that were out of stock or not usually available.

For future surveys it is recommended that the formal title of the store and street address is collected on the survey instrument as during analysis it was found that these details are sometimes not available other than from the store manager themselves.

### **2.6 Survey collection instrument**

The survey collection instrument was prepared using Microsoft Excel® spreadsheet. A final PDF version was created and printed for use by data collectors. The quality assessment tool was prepared using Microsoft Word® processing package. This allowed for colour charts used to assess the grade of meat and fat, and colour versions to be printed. A simplified version of both tools was prepared using Microsoft Excel® spreadsheet for data entry. The hard copy was returned to the Department of Health and data was entered by hand.

### **Pilot testing of instrument**

The instrument was piloted for ease of use, feasibility and length of time required to collect prices for the 430 items in the basket. The two large supermarket chains were provided with a copy of the list of foods to be priced prior to testing. Piloting was only conducted at two local metropolitan supermarkets (IGA and Woolworths) as Coles® management did not provide permission to pilot test the survey instrument in their stores prior to conducting the full FACS. Coles® main concern was that the survey would not meet its objectives and that the assessment of quality was a major confounder and not possible at point of sale. They did however, agree to the final survey and notified their nominated stores that surveyors would be in-store and assistance was provided.

It took approximately three hours to record the prices of the foods in the FACS basket. This was with collectors familiar with the contents of the basket recording the prices; it was anticipated it would take slightly longer for other data collectors, and the full basket would include the quality assessment.

The final design of the questionnaire takes into account all the issues encountered in the pilot testing to simplify and speed up the price collection process when in the supermarket. After pilot testing, the descriptions of some of the individual items were clarified and the order of the items in the instrument was rearranged to enable faster collection of the prices, for example, all frozen foods were placed together. The instructions that accompany the survey questionnaire

were refined. Due to time constraints the quality assessment tool was not pilot tested. This is the first time such a detailed objective quality assessment has been attempted.

#### **Box A: Recommendations for foods and survey instrument**

1. Reduce the overall number of foods to reduce survey time (i.e. 3 only of each food)
2. Strengthen recording of foods not available -allow for inclusion of alternative brand/variety if specific survey foods are not available
3. Select only fruit and vegetables in season
4. Include images of each product in training to assist recognition and speed of data collection
5. Continue to explore the possibility of electronic data collection (via supermarket provision of )

#### **2.7 Limitations of the survey**

The process for developing the FACS identified a number of additional research questions that were of interest relating to pricing as a potential influence on food choice. The literature review and current industry trends highlighted the potential importance of monitoring the price implications for serving size and emerging pre-prepared meals area. To fully explore these issues was outside the scope of the current project.

Total sales give an indication of the foods purchased and likely to be consumed. The supermarkets were unwilling to provide the top 25 foods sold. It may be possible to obtain this information in the future.

#### **Box B: The potential for future research projects on processed food**

6. Consider further research projects identified when conducting the pilot:

- *Cost implications of convenience and single serve packaging*

Many foods are available in packaging and forms that are more convenient for the consumer. For example, a 1kg of cheddar cheese is now available in a whole block, grated or cubed; the same brand of 500g of frozen potatoes is available in chunks, cubes or slices. An assessment of the impact of different packaging and processing on price could be the subject of a future research project.

- *Cost implications of convenience ready-made meals*

Ready-made or 'heat and eat' meals are heavily marketed and promoted, many as 'healthy' options. Exploring the comparative cost and nutritional value of these meals with 'cooking from scratch' is recommended.

- *Cost implications of marketing and promotion directed at children*

Many foods are heavily marketed and promoted to children. The cost and nutrition implications of regularly consuming these foods could be the subject of a future research project.

- *Range and availability of a foods*

The number of food products is estimated to vary from 600 to over 30,000 per grocery store. The available choice influences food purchasing. The top 25 food products sold per store would give an indication of foods consumed.



### 3. Sampling

The intention of the survey was to determine cost as a determinant of food choice in Western Australia whilst testing the feasibility of a national food access and pricing monitoring system. This meant that the sample of stores selected needed to be representative of WA food grocery stores. All community stores were selected as part of the sample as food security is an identified issue.

#### 3.1 Sampling overview

A list of the locations of all Coles, Woolworths and IGA supermarkets in WA was compiled from the electronic White Pages® and supermarket websites. The locations of all identified supermarkets were geo-coded and mapped by the Epidemiology Branch at the Department of Health.

Prior to the survey, the location for each remote Indigenous community and community store in WA was not available or collated. A number of government agencies were approached to obtain a list, the Aboriginal Environmental Health team regularly visit communities and through their networks obtained the most recent information on location. These were also mapped. These maps show the nearest large town, major roads, Statistical Local Area (SLA) boundaries and remoteness area (RA), as defined by the ABS' Remoteness Structure<sup>13</sup>. Early versions of these maps were useful when developing the methodology used to sample the stores. Figure 1 shows supermarket grocery store locations in WA by remoteness, and Figure 2 shows the stores by Perth metropolitan area.

The method for sampling used in Queensland's Healthy Food Access Basket<sup>14</sup> was reviewed. For the HFAB, Queensland towns were stratified according to their RA. The very remote area was split into two strata based on whether the town was more or less than 2000km from Brisbane and islands were placed in their own stratum. This approach allowed oversampling in the remote areas and controlled the number of islands selected. Stores were then randomly selected across the strata.

A similar approach was taken for the FACS sampling. The socio-economic status and the remoteness area of the SLA in which the supermarket is located were used to stratify the stores. The socio-economic status is based on the ABS' socio-economic index for areas (SEIFA)<sup>15</sup>. Where the Queensland model split the very remote category into two strata to allow oversampling, this wasn't done for the FACS. Instead, all supermarkets and stores in the very remote area were selected to be surveyed.

#### 3.2 Stratification

Statistical local area was chosen as the geographic selection unit. The suburb in which each supermarket is located was matched to the relevant SLA. Using SLA meant other statistical measures which are available by SLA, such as SEIFA, RA and population figures, could be matched for analysis. For example, the population of the SLA in which each supermarket is located gives an indication of the number of people who potentially shop at that store.

Datacubes of all WA SLAs, their SEIFA quintile, remoteness area and estimated resident population from the 2006 Census were obtained from the ABS website and Geography section then combined with the list of all supermarkets. They were then allocated scores for SEIFA and remoteness and this was used to stratify the supermarkets and SLA as in Table 3.

Figure 1: Supermarket locations, WA

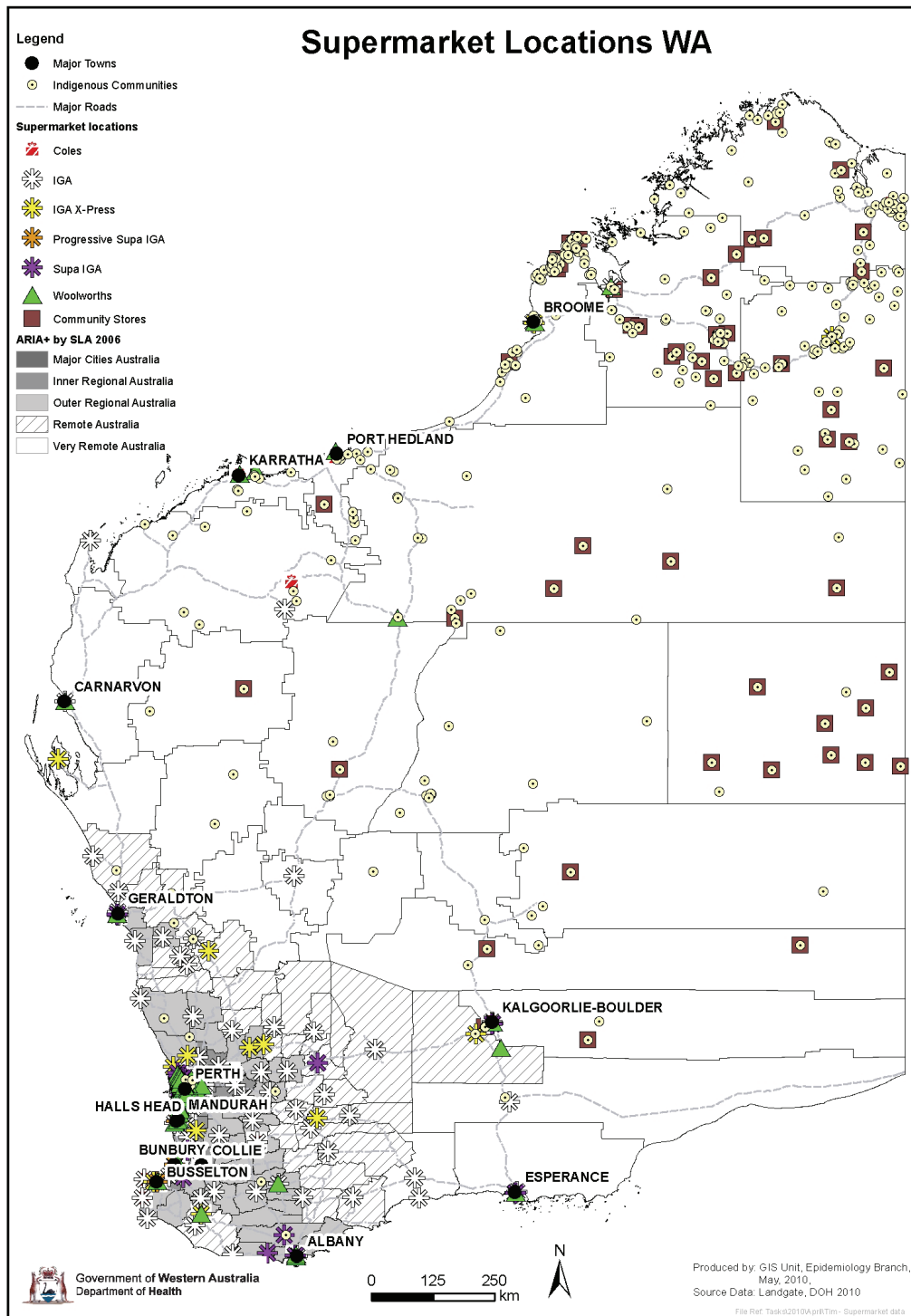
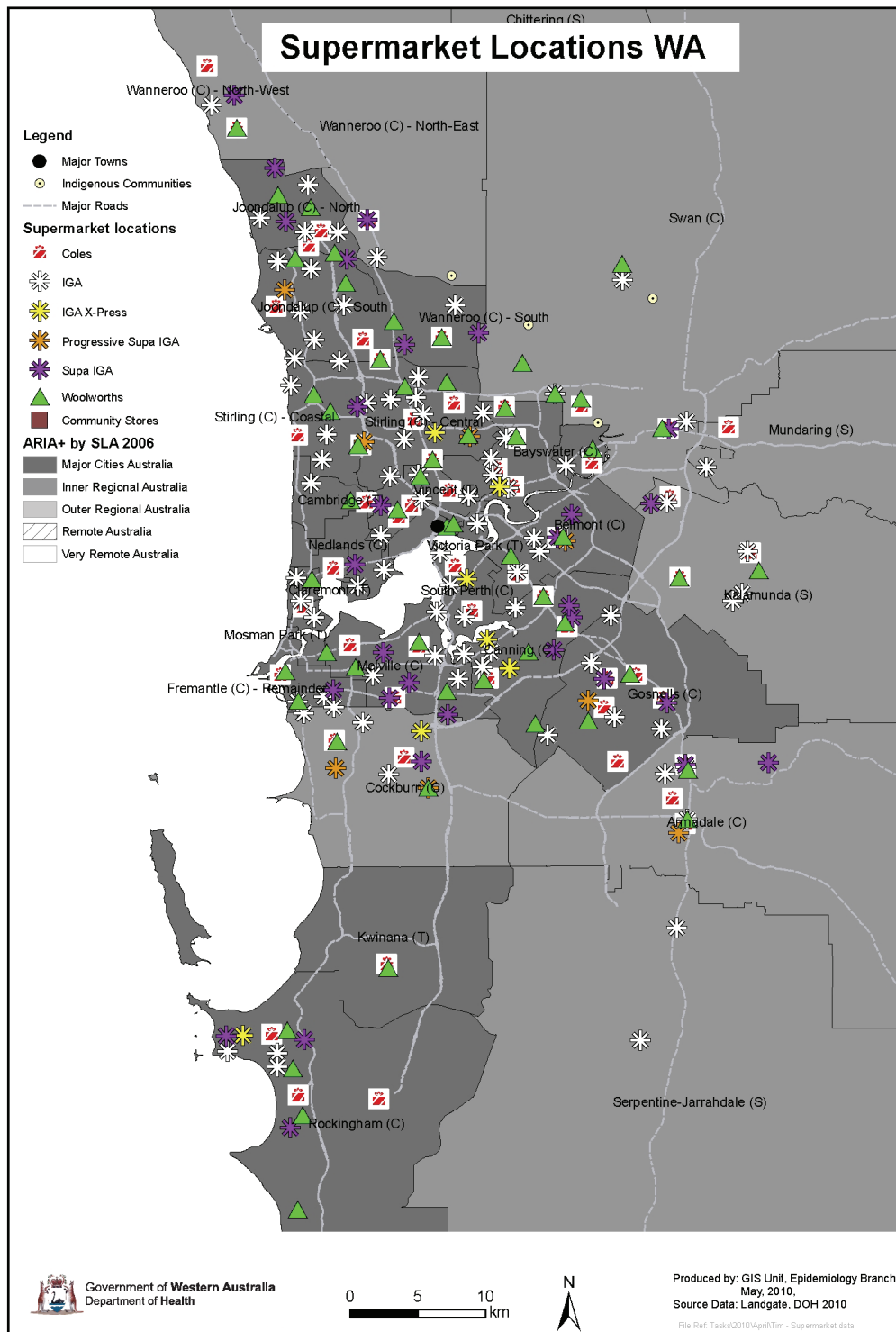




Figure 2: Supermarket locations, Perth metropolitan area



**Table 3: WA SLAs and supermarkets by Remoteness Area and SEIFA**

SEIFA quintile	Major cities		Inner regional		Outer regional		Remote		Very remote		Total	
	SLAs	Stores	SLAs	Stores	SLAs	Stores	SLAs	Stores	SLAs	Stores	SLAs	Stores
1	0	0	2	4	10	12	7	3	12	3	31	22
2	1	2	3	4	16	23	9	10	2	2	31	41
3	2	17	5	14	12	6	10	10	2	1	31	48
4	8	89	6	24	9	12	6	7	2	3	31	135
5	25	139	3	3	0	0	2	5	1	2	31	149
<b>WA</b>	<b>36</b>	<b>247</b>	<b>19</b>	<b>49</b>	<b>47</b>	<b>53</b>	<b>34</b>	<b>35</b>	<b>19</b>	<b>11</b>	<b>155</b>	<b>395</b>

### 3.3 Sample methodology

At the time of survey, there were 447 grocery stores identified across 155 SLAs in WA from which to source food prices. Due to time and budget constraints, a representative sample of stores was chosen.

#### Selection unit

Since we are pricing where people shop rather than the stores themselves, SLA was used as the selection unit. One store from each chain was selected to be surveyed within each SLA. The cost of each food item in the FACS basket was averaged across all supermarkets surveyed in each SLA. Using SLA as the selection unit, and then selecting one store from each chain in that SLA, enables comparison of the average prices of food by geographic location.

If the supermarket was used as the selection unit, then comparisons could only be made of the prices by each supermarket and no reasonable comparisons could be made by geographic location. For example, we may randomly select a more expensive store in one suburb and a less expensive store in another suburb which would result in an unequal comparison. Surveying one store from each chain in the selected SLA, then averaging the prices across these three stores, reduces the likelihood of this occurring.

#### Sample size and sample allocation

Using the sample size calculator on the National Statistical Service website<sup>16</sup> a suitable sample size from a population of 155 (with a 10% confidence interval) is 65.

One of the objectives of the survey is to compare the cost and availability of the basket of foods in very remote areas. The 19 very remote SLAs were removed from the population and the remaining sample was allocated among the other 136 SLAs. All supermarkets in the very remote SLAs were selected to be surveyed; i.e. the very remote strata were fully enumerated.

Proportional allocation was used to allocate the sample. The sample was allocated among the strata, in proportion to the stratum sizes, where the stratum size was the number of SLAs in the stratum. The allocation proportion of the total sample size for stratum  $h$  is:

$$f_h^* = N_h / N$$

Where  $N_h$  is the number of SLAs in stratum  $h$  and  $N$  is the total number of SLAs for all strata. Based on this proportion, the target sample size for stratum  $h$  is:

$$n_h = f_h^* \times n$$

Where  $n$  is the total sample size. So for the total sample of SLAs,  $n = 65$ , the sample size for stratum 25 /  $155 \times 65 = 10$ , as in Table 4. SAS Enterprise Guide<sup>17</sup> was used to allocate the sample and a dataset containing the sample allocation information was generated. SAS rounds target sample sizes to integers and has the restriction that all values of  $n_h$  must be at least 1. This is so at least one unit will be selected from each stratum. Since the SLAs in very remote

areas were completely enumerated, they were not included in the sample allocation process. Table 4 shows the sample allocation summary for the WA FACS.

**Table 4: Sample allocation**

SEIFA quintile	Major cities	Inner regional	Outer regional	Remote	Total
1	0	1	5	4	10
2	1	2	7	5	15
3	1	2	5	5	13
4	3	3	4	3	13
5	10	3	0	1	14
<b>WA</b>	<b>15</b>	<b>11</b>	<b>21</b>	<b>18</b>	<b>65</b>

### 3.4 Sample selection

#### Selection of SLAs

Population was used as a proxy for the number of people who have access to each supermarket. Population figures from the 2006 Census were obtained from the ABS for each SLA and totalled for each stratum based on SEIFA and RA.

Selection of SLAs was made by systematic random sampling with probability proportional to size. The selection probability for unit  $i$  in stratum  $h$  equals  $n_h Z_{hi}$  where  $n_h$  is the sample size for stratum  $h$ , and  $Z_{hi}$  is the relative size of unit  $i$  in stratum  $h$ . The relative size equals  $M_{hi} / M_h$ , which is the ratio of the size measure for unit  $i$  in stratum  $h$  ( $M_{hi}$ ) to the total of all size measures for stratum  $h$  ( $M_h$ ).

Systematic random sampling selects units at a fixed interval throughout the stratum after a random start. SAS uses a fractional interval to provide exactly the specified sample size. The interval equals  $M_h/n_h$  for stratified sampling.

Each SLA was ranked alphabetically in each stratum and the population of each SLA was used as the size variable. PROC SURVEYSELECT in SAS was used to generate the sample using the sample allocation dataset created in the earlier step described above and the dataset of SLAs.

#### Selection of supermarkets

All the supermarkets in each SLA were ranked alphabetically by store name which is normally the suburb name. Then the first store for each supermarket chain was selected to be surveyed. In the event there were no stores from a particular chain in the SLA, then no stores from that chain were selected. Table 5 shows the final number of SLAs randomly selected and the number of stores selected to be surveyed within each SLA.

#### Remote Indigenous community stores

A census survey of the price of foods in all remote community stores had never been collected in WA. One of the main objectives of the survey was to compare prices of food in remote Indigenous communities with the Perth. In order to achieve this objective, it was necessary to survey all remote Indigenous community stores. In WA, these stores are all located in remote or very remote areas, and were included sample selection. Table 5 shows the final number of SLAs and stores selected including the remote community stores.

**Table 5: Final number of SLAs and stores selected**

SEIFA quintile	Major cities		Inner regional		Outer regional		Remote		Very remote		Total	
	SLAs	Stores	SLAs	Stores	SLAs	Stores	SLAs	Stores	SLAs	Stores <sup>(a)</sup>	SLAs	Stores <sup>(a)</sup>
1	0	0	1	2	3	6	2	2	6	38	12	48
2	1	2	1	1	5	10	4	11	2	2	13	26
3	1	3	2	5	2	2	3	4	1	6	9	20
4	4	12	1	3	1	3	2	9	2	3	10	30
5	10	29	1	2	0	0	2	3	1	2	14	36
WA	16	46	6	13	11	21	13	29	12	51	58	160

(a) Includes remote Indigenous community stores

## 4. Data collection

### 4.1 Data collection timeframe

Data collection commenced on the 9<sup>th</sup> of August 2010. We proposed data be collected on the 9-11 August 2010. Ideally, data collection should be within the same timeframe at all stores in the sample, however, for a number of reasons, this was not possible.

At the time of the survey, supermarket trading hours in WA for the two main supermarket chains were: 8am until 6pm Monday to Friday, with extended night trading hours on Thursday to 9pm and weekend trading on Saturday 8am until 6pm. The IGA stores were able to trade seven days a week from 7am until 7pm. Indigenous community stores trading hours varied according to capacity and demand.

After consultation with the major supermarket chains, they identified Monday, Tuesday and Wednesday as preferred collection days since they were slower shopping days and additional people in-store collecting data would be less disruptive to customers. The preferred time was in the morning when the stores opened. The major supermarket chains also informed us that prices were usually set on Mondays and tended to change over the week to remain competitive, especially fresh produce prices, so prices earlier in the week would be more stable.

It was not possible to coordinate collectors in all areas to conduct the survey during the preferred three day period. In the more remote areas and the remote Indigenous community stores in particular this was almost impossible due to road conditions, lack of personnel to undertake the survey and the distances and road conditions to some stores. Data collection was conducted throughout August with the preference for earlier in the week commencing as the store opened. Variation in price due to seasonality, e.g. for fresh fruit and vegetables, was not likely to be a significant problem over this time period.

As we aimed to collect a census survey of all remote community stores, data collection in some of these stores continued until September.

## 4.2 Data collectors

The Food Unit at the Department of Health routinely conducts food monitoring surveys statewide coordinating data collection through local government. An email was sent to local governments' Environment Health Officers in the areas selected to be surveyed with a request to undertake the survey during the prescribed time. Some local governments had up to six stores to conduct the survey in. While most were able to assist, some declined due to lack of staff or other priorities. Some local governments indicated that the amount of time it would take to conduct the surveys would take staff away from core business. Environment Health Officers, their university students on practicum, or administrative staff were designated by local governments to conduct the survey. The Environmental Health Directorate Food Unit and the Science and Policy Unit staff conducted surveys in areas where there was no EHO capacity, or an unwillingness to participate. Curtin University research assistants, local public health nutritionists and their placement students also assisted with data collection.

The local governments working with remote Indigenous communities needed additional time and resources to arrange visits to the very remote area. Some councils only travel to the communities every few months and required accommodation to conduct additional work. They therefore needed greater notification so they could arrange to conduct the survey during their normal visits to the communities.

### Box C: Data collection recommendations for FACS

To ensure all a complete store sample, future cycles of the survey should:

7. Be coordinated centrally in partnership with government Health Departments, the Australian Bureau of Statistics, Universities training EHOs and dietitians and implemented via local government. For example, in WA the survey should be managed by Food Unit at the Department of Health in partnership with local organisations (e.g. Environmental Health Officers, WA Country Health Services, Curtin University School of Public Health).
8. Be conducted annually at the same time of year. This would enable local governments to schedule staff to conduct the survey as part of routine business.
9. Allow local governments servicing remote Indigenous communities to combine the survey into their scheduled visits.
10. Ensure surveyors are fully trained in implementing the survey. Unfamiliarity with the survey and foods to be priced increases implementation time.
11. Consider incentives to secure skilled surveyors. This may be required in rural or remote areas for additional travel or accommodation.
12. Time survey to coincide with University Public Health student placement (EHO, nutrition or dietetics). Feedback indicated that with the training and appropriate supervision, implementing this survey provides a valuable work placement experience.

## 4.3 Training material

Due to the spread of data collectors across the state and the short lead in time, a method to provide training and quickly contact all collectors was imperative. Survey instructions were developed and distributed with the survey collection instrument and data quality tool via a Google® group to distribute detailed training.

## **Survey instructions**

General guidelines were developed for data collectors on how to present themselves in the store, how to conduct the survey and what to expect when collecting the data. Instructions described in detail how to collect prices for fruit, vegetables, meat and poultry as well as other grocery items. They outlined food items that were not as straight forward as simply finding the item and pricing it.

A separate set of instructions were developed for the quality assessment tool. These instructions included definitions for some of the less familiar terms used on the tool as indicators of quality.

The full set of instructions was compiled together into a booklet that was provided to each collector in hard copy and the collectors were told to take the instruction booklet with them as a reference when conducting the survey.

## **Training for data collectors**

There were insufficient resources to conduct face-to-face training. A single easily accessible repository for all the training material, via a Google group® was setup. Access to the Food Access and Cost Survey group<sup>18</sup> with all training material was restricted. Electronic copies of the collection instrument and quality assessment tool and a copy of the instruction booklet were held at the Google group for download if collectors needed extra copies. A discussion forum was set up to quickly inform collectors of any issues that occurred. It was also possible for collectors to pose questions on the forum, although this facility wasn't utilised.

## **Training presentations**

Eight short training presentations addressed all aspects of the survey. Each presentation was designed so that it would only take collectors about five minutes to view each one. Each presentation was uploaded to the Google group for collectors to review in their own time.

Follow up conversations with some collectors revealed that not all of them had viewed the presentations prior to going out in the field to conduct the survey which may have contributed to the time taken by some collectors to conduct the survey.

The presentations covered:

1. An overview of the survey
2. Instructions on to proceed in the store
3. Separate detailed instructions and examples of how to collect prices for fruit, vegetables, meat and general groceries
4. Instructions on how to assess the quality of fruit, vegetables and meat
5. Instructions on where to return the completed surveys at the Department of Health.

## **Effectiveness of training**

Following the survey, some data collectors were asked how useful they found the Google group and training material. While some made use of the training material provided, not all collectors reviewed the material before conducting the survey. For future cycles of the FACS there will need to be a more effective way to provide training.

## Box D: Training recommendations for FACS

Based on the experience with training future cycles of the survey could:

13. be provided on a secure section of the Department of Health's Food Unit website
14. include face-to-face instruction where possible
15. be conducted annually and use previous survey conductors to build capacity

### Data entry

Once the surveys were completed and returned to the Department of Health, the data were entered into a separate Excel spreadsheet for each store. These Microsoft Excel® spreadsheets were then imported into SAS EG<sup>17</sup> and some basic data cleaning was undertaken. Then data from all stores were collated into a single SAS dataset for analysis.

## 5. Data analysis

### 5.1 Data for analysis

#### Average prices of foods

For each food item in the survey with a price, the price per 100g, or 100ml (referred to as the unit price) was calculated. For those foods where more than one price was collected, the average price and average unit price for that item was also calculated. For example, if prices have been obtained in Supermarket X for four different brands of a 500g packet of spaghetti, then the average price for spaghetti in Supermarket X will be calculated from those four prices. If only one price for a 500g packet of spaghetti has been collected in Supermarket Y, then that price will be used for spaghetti in Supermarket Y. This was done for each store.

The average price and average unit price for each food was then calculated for each SLA. The average unit prices were then used as the basic building block for all other analysis.

#### Nutrition information and food group classification

Nutrition information (kilojoules content) for each food was collected from either the Nutrition Information Panel (NIP) on the product for packaged foods, or obtained using FoodWorks® 2009 nutrient analysis package for those foods without a label.

FoodWorks was also used to identify the average weight for fruits and vegetables. This was then used to calculate the price per 100g when produce was sold as individual pieces.

Each food was classified according to food group and sub-group categories consistent with the Australian Total Diet and Foundation Diet modelling to allow for analysis by food categories; e.g. core foods (meat and alternatives, fruit, vegetables, cereal foods, nuts, green vegetables and discretionary foods –confectionery etc).

#### SLA data

Information, in addition to the remoteness category and SEIFA score of each SLA, was obtained from the ABS. This includes estimated resident population<sup>19</sup> and Aboriginal population<sup>20</sup> and estimates of personal income<sup>21</sup>.



## Distance from Perth

Geographic Information System mapping of supermarket locations and Google Maps® were used to estimate the distance and time taken to travel from the Perth CBD, by road, of each store in the sample.

Using these estimates, each store was assigned to a category based on how far it is from Perth, as shown in Table 6. This information was used to impute missing prices for foods. When there was no price for a particular food available for a store, a price was imputed based on the average price from other stores in the same distance category as the store with the missing price.

**Table 6: Distance category**

Distance from Perth CBD (kms)	Number of stores	Distance from Perth CBD (hours)	Number of stores
Less than 100	48	Less than 1	46
100 to 999	50	1 to less than 12	51
1000 to 1999	22	12 to less than 24	21
2000 to 2999	35	24 to less than 36	33
3000 or more	5	36 or more	9
<b>Total</b>	<b>160</b>		<b>160</b>

## Income data

Estimates of weekly disposable household income were obtained from the Household Expenditure survey<sup>22</sup>. Weekly welfare payments were estimated using Centrelink's online calculators<sup>23</sup>. These estimates were obtained for each of the reference families comprising a two parent family and a single parent family each with two children.

## Quality of fruit, vegetables and meats

Quality was measured by applying a score to each of the attributes in the quality assessment tool if that quality was present in the food when assessed at point of sale. These scores were added up to give a quality score out of 100 for each fruit or vegetable. The attribute measuring whether or not the produce was stored in the fridge was not included in the quality score; fridge storage was a confounder as it was assessed as good for very remote stores but not good for metropolitan area stores. Any fruit or vegetables that scored 100 were considered to be of good quality; scores less than 100 were considered of poor quality.

## 5.2 Market baskets

The Western Australian pilot FACS was intended as a feasibility study for a national food pricing monitoring system. Analysis of the price of a healthy food basket was undertaken using the composition of several of the current Australian market basket surveys. The difference between the compositions of various jurisdictional baskets resulted in differences in the cost of a healthy food basket. Food basket compositions were based on each survey's objectives at the time of development. Since then trend analysis has been conducted over time with repeat surveys. Testing the multiple baskets identified the possibility of a single FACS basket that enabled multiple types of market baskets to be assessed for a national price monitoring system to health. Using these market basket surveys enabled a comparison of Western Australian grocery prices with other jurisdictions.

## Queensland Healthy Food Access Basket

The Queensland Government's Healthy Food Access Basket (HFAB) was developed by Queensland Health in 1998. The main objective of the HFAB is to monitor changes in the cost, availability and variety of food items in urban, rural and remote areas of Queensland. The



basket represents the meals for a reference family of six for a period of two weeks. At the time of this report, the most recent data available are from 2006.

Using the composition of the HFAB, the Western Australian survey results were applied so that an average basket cost was obtained by SLA. From this it was possible to assess the relationship between price and remoteness across WA. In order to compare WA prices with Queensland data, the 2006 Queensland prices were inflated by the change in the Brisbane CPI for food over the same period. Preliminary results are shown in Section 6.

### **Northern Territory Market Basket**

The Northern Territory Market Basket Survey was developed by the NT Department of Health and Families in 1998. Similar to the HFAB, the main objective of the NT basket is to monitor changes in the cost, availability and variety of food items in urban, rural and remote areas of NT, in particular in remote Indigenous communities. The basket represents the meals for a reference family of six for a period of two weeks. At the time of this report, the most recent data available are from 2008.

Using the composition of the HFAB, the Western Australian survey results were applied so that an average basket cost was obtained by SLA. From this it was possible to assess the relationship between price and remoteness across WA. In order to compare WA prices with NT data, the 2008 NT prices were inflated by the change in the Darwin CPI for food over the same period. Preliminary results are shown in Section 6.

### **Healthy Food Basket affordability by welfare recipients**

This basket examines the cost of healthy food habits for welfare-dependent families in Australia. A theoretical market basket was developed to assess the proportion of income required for food for welfare recipients versus people on an average income. This analysis utilised the same methodology developed by Kettings et. al. (2009) using web-based pricing of a food basket in metropolitan Melbourne <sup>24</sup>. The basket represents the weekly cost of meals for different welfare-dependant reference families – a couple with children, a single parent family, and elderly welfare recipients. The proportion of each family's 'disposable' income from welfare payments that would be required to purchase the food basket was calculated. Disposable income represents the amount of money available to meet the needs of households. It is derived by deducting estimates of personal income tax and the Medicare levy from gross income. In the current analysis actual pricing of foods in Western Australia were used by region and current income and welfare payments were calculated from the Centrelink website. The preliminary results are also shown in Section 6.

### **Other analysis**

The range of foods that are included in the FACS questionnaire make it possible to compare how prices are related to purchase for foods of different characteristics. For example related to food processing, nutrient content (kilojoules, fat, sugar, and sodium), or whether items were on sale or not. Initial analysis was conducted on the kilojoule content per price of foods; other analysis is outside the scope of this current report.

## **6. Results**

### **6.1 Response rate**

The response rate was 90% with data received from 144 of the 160 stores selected. Of the 52 community stores that were on the original list, eight were closed and two were found not to be operating as stores when surveyed, resulting in an eligible sample of 38. Ninety seven individual surveyors implemented the 144 surveys across the state. It took surveyors between

one and 12 hours (two people six hours in one store) to complete the survey with the average time of 4.1 hours. The variation in time was due to size of store and whether or not pricing labels were on food. Community stores took an average of 2.5 hours to complete due to fewer foods to choose from.

## 6.2 Cost of food by geographical location

The cost of foods significantly increased with distance from major capital city in WA. A variety of analyses were conducted to determine the cost of food by geographic location. These included the cost of a healthy food basket using the QLD and NT models and the relative cost of foods based on energy density. Each basket was calculated using food pricing in the metropolitan area, regional, remote and very remote areas. Each of these food basket costs was being compared to the mean cost of the same food basket for WA.

### Cost of a Healthy Food Access Basket

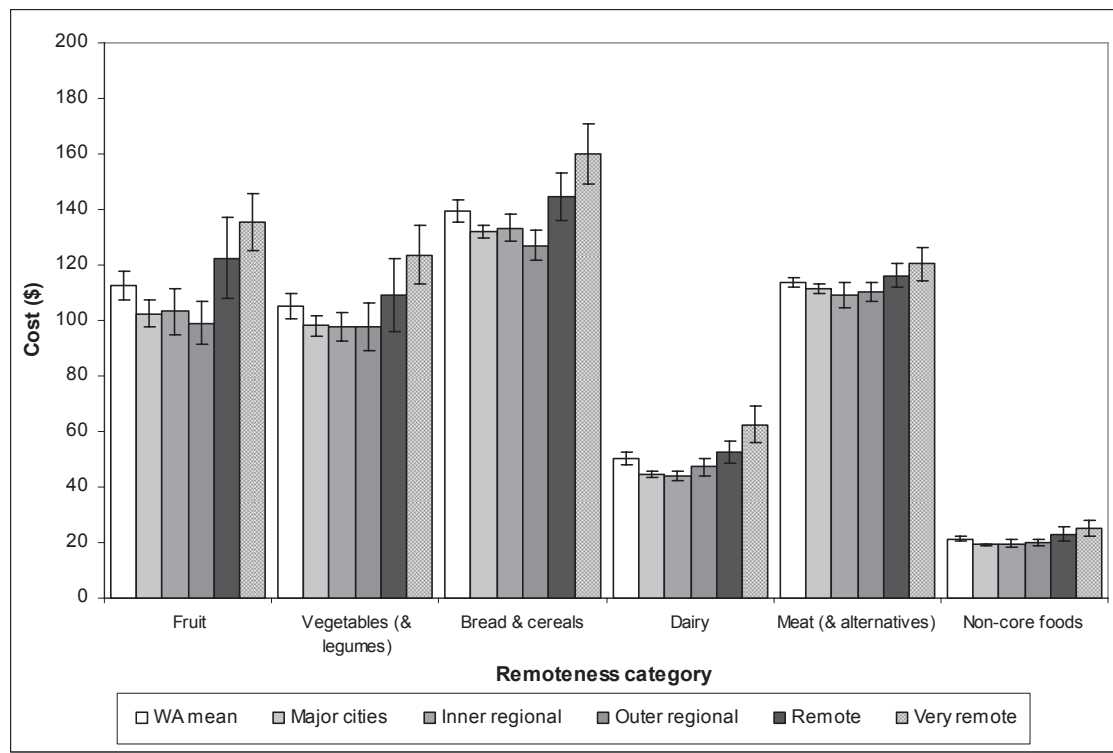
Overall the cost of a healthy food basket was proportionally greater, 23.5% in very remote areas. See Table 9 for the mean cost of the HFAB by geographic location. There was no significant difference by SIEFA index. The increase in food cost with geographical location was across all food groups, there were significant differences in the WA mean and remote and very remote areas for all food groups. The increase was particularly noticeable for fruits, vegetables, bread and cereals, dairy and meat. However it was also noted for non-core foods. Figure 2 demonstrates the proportionally increased in cost of food groups.

**Table 7: Mean cost of HFAB basic food groups by remoteness, WA**

	Western Australia	Major cities	Inner regional	Outer regional	Remote	Very remote	Increase from Major cities to very remote	Kendall's Tau <i>p-value</i>
Food group	\$ (CI)	\$ (CI)	\$ (CI)	\$ (CI)	\$ (CI)	\$ (CI)	%	
Fruit	112.58 (107.31- 117.85)	102.51 (97.78- 107.24)	103.20 (95.11- 111.28)	99.06 (91.52- 106.60)	122.56 (108.12- 137.00)	135.54 (125.08- 145.99)	32.2	<0.0001
Vegetables (& legumes)	105.13 (100.74- 109.53)	98.02 (94.36- 101.67)	97.61 (92.38- 102.84)	97.65 (88.95- 106.34)	108.91 (95.72- 122.10)	123.60 (112.92- 134.29)	26.1	0.0005
Bread & cereals	139.32 (135.23- 143.41)	132.02 (129.58- 134.46)	133.33 (128.46- 138.21)	127.02 (121.68- 132.36)	144.42 (135.96- 152.89)	160.04 (149.19- 170.88)	21.2	<0.0001
Dairy	50.15 (47.83- 52.46)	44.59 (43.71- 45.48)	44.10 (42.44- 45.75)	47.23 (43.99- 50.46)	52.71 (48.65- 56.77)	62.43 (55.85- 69.02)	40.0	<0.0001
Meat (& alternatives)	113.68 (111.82- 115.54)	111.42 (109.48- 113.36)	109.01 (104.35- 113.67)	110.49 (107.04- 113.95)	116.22 (111.95- 120.50)	120.29 (114.42- 126.16)	8.0	0.0017
Non-core foods	21.32 (20.35- 22.29)	19.15 (18.66- 19.65)	19.67 (18.39- 20.96)	19.75 (18.58- 20.92)	23.09 (20.59- 25.59)	25.21 (22.15- 28.26)	31.6	<0.001
<b>Total healthy food basket</b>	<b>542.19 (525.73- 558.65)</b>	<b>507.71 (499.40- 516.01)</b>	<b>506.92 (495.87- 517.97)</b>	<b>501.20 (490.43- 511.97)</b>	<b>567.92 (529.26- 606.59)</b>	<b>627.11 (587.59- 666.64)</b>	<b>23.5</b>	<b>&lt;0.0001</b>



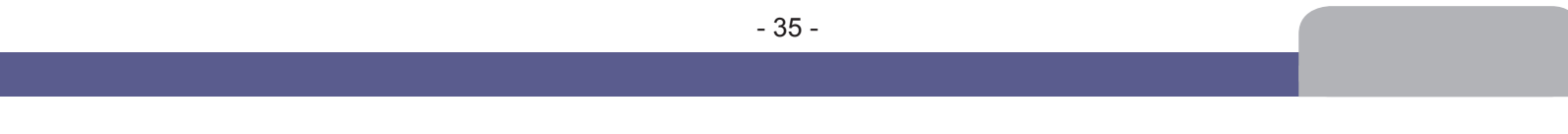
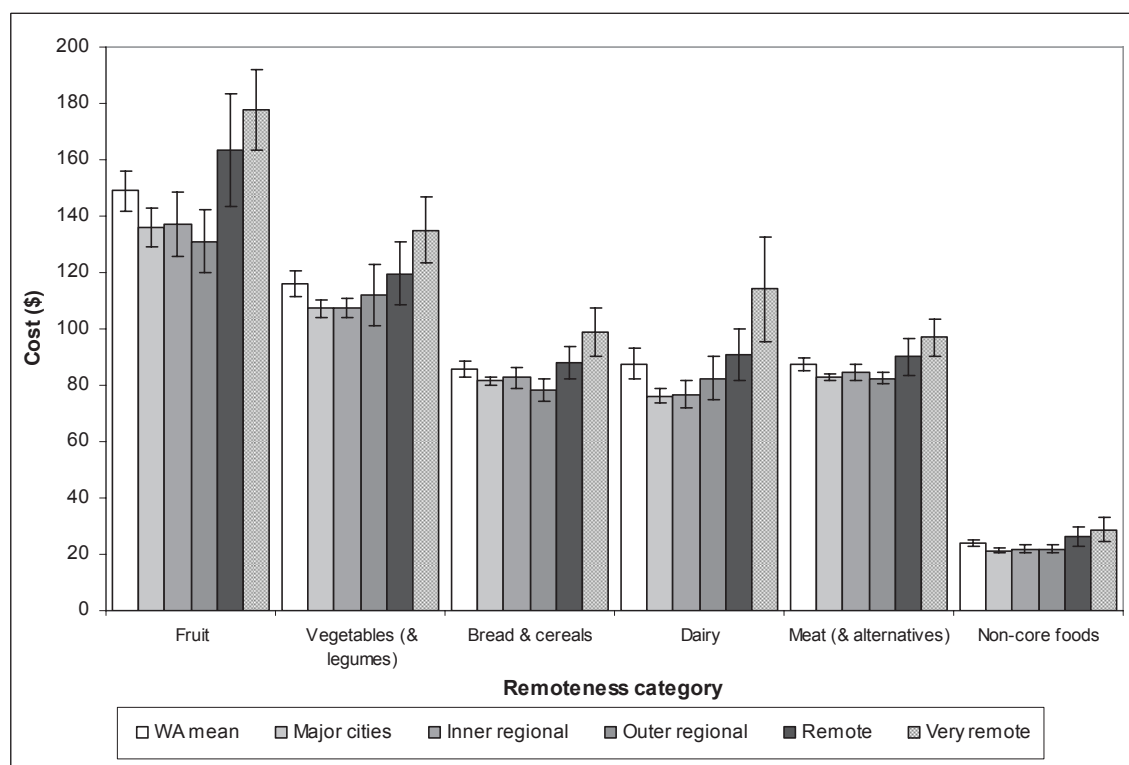
**Figure 3: Mean cost of HFAB basic food groups by remoteness, WA**



**Healthy food basket using Northern Territory Market Basket**

Similar results were found using the Northern Territory Market Basket foods.

**Figure 4: Mean cost of NT basket food groups by remoteness, WA**



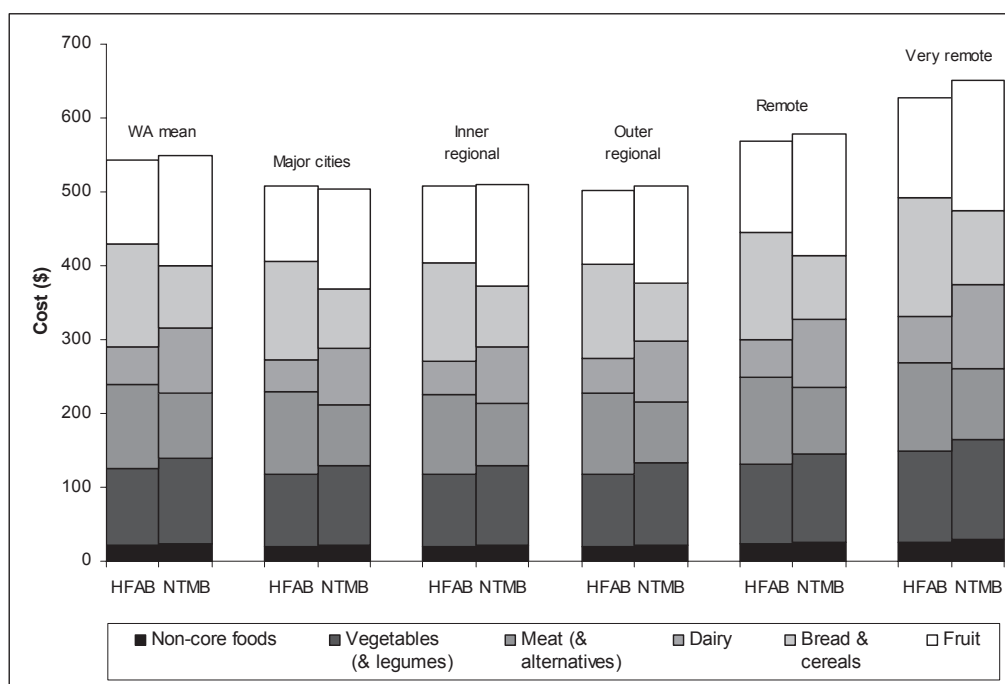
## Comparison of the baskets

Although the composition of the baskets were slightly different (see Table 8), generally the comparison of healthy food baskets pricing was similar using the Queensland and Northern Territory baskets. This demonstrated the feasibility of having a single market basket survey that could be implemented as part of a national food and nutrition monitoring system. The differences in the composition of the baskets and affordability of the foods, for example using dried milk instead of fresh milk, influenced the total price of the basket.

**Table 8: Comparison of foods in HFAB, IHFB and NT MBS**

	HFAB	IHFB	NT MBS		HFAB	IHFB	NT MBS
<b>Cereal group</b>				<b>Meat, meat alternatives group</b>			
white bread	✓		✓	canned corned beef	✓		✓
crumpets		✓		canned meat & vegetables	✓		✓
fruit toast		✓		leg of lamb		✓	
wholemeal bread	✓	✓		lean meat	✓		
white flour	✓		✓	beef mince	✓		✓
whole meal flour	✓			beef mince (extra lean)		✓	
sultana bran		✓		pork chops, forequarter		✓	
weet bix		✓	✓	rump steak	✓		
rolled oats	✓	✓	✓	rump steak, lean		✓	
white hamburger buns	✓	✓		frozen chicken	✓		✓
white spaghetti		✓		frozen chicken, whole		✓	
white rice		✓	✓	frozen fish, crumbed, baked		✓	
canned spaghetti	✓	✓	✓	canned tuna, in spring water		✓	
instant noodles	✓			canned smoked oysters	✓		
SAO biscuits	✓			eggs	✓	✓	✓
dry biscuits low fat	✓			sausages	✓	✓	
crisp bread (Paradise Lites)		✓		light leg ham, sliced		✓	
<b>Fruit</b>				canned ham	✓		
apples	✓	✓	✓	peanut butter, n.a. salt		✓	
oranges	✓	✓	✓	<b>Dairy group</b>			
bananas	✓	✓	✓	fresh full cream milk	✓		
kiwi fruit		✓		fresh reduced fat milk	✓	✓	
canned peaches		✓	✓	powdered milk			
canned fruit salad, natural juice	✓			powdered milk whole	✓		✓
orange juice (100%, n.a. sugar)	✓	✓	✓	powdered skim milk	✓		
<b>Vegetable &amp; legume group</b>				long life milk	✓		
tomatoes	✓	✓	✓	low fat vanilla yoghurt		✓	
potatoes	✓	✓	✓	cheese	✓	✓	✓
pumpkin	✓		✓	<b>Non-core foods, extras</b>			
cabbage	✓		✓	canola margarine		✓	
lettuce	✓	✓		unsaturated margarine	✓		✓
zucchini		✓		white sugar	✓	✓	✓
mushrooms		✓		canola oil	✓	✓	
carrots	✓	✓	✓	cake, plain or Madeira		✓	
broccoli		✓		cola soft drink, can	✓	✓	✓
avocado		✓		chocolate milk		✓	
onions	✓	✓	✓	coffee, instant		✓	
frozen peas		✓		honey		✓	
frozen mixed vegetables	✓	✓		low fat ice cream, vanilla		✓	
canned peas	✓		✓	Milo		✓	
canned baked beans	✓	✓	✓	spicy fruit rolls		✓	
canned beans (green)		✓	✓	tea		✓	✓
canned corn kernels		✓		vegemite		✓	
canned tomatoes, n.a. salt		✓	✓	meat pie, hot only	✓		✓
canned beetroot	✓			<b>Other</b>			
tomato paste, n.a. salt		✓		tobacco, wallet	✓		✓
				cigarettes, packet	✓		✓

**Figure 5: Comparison of Queensland HFAB and NT market basket**



The use of the multiple market baskets enabled a comparison of food pricing by jurisdiction. The Northern Territory food prices appear to be the most expensive.

### 6.3 Affordability of food by geographic location

Welfare recipients required a greater proportion of their disposable income to purchase food than those of on an average income, 47% compared to 16%.

**Table 9: Mean weekly cost of meal plan and income left after meal plan is purchased for couple family**

	WA	
	Welfare income \$	Average income \$
Cost of meal plan	298.07	298.07
Income	631.83	1920.70
Income left after meal plan	333.76	1622.63
Proportion of income required to purchase meal plan	47%	16%

### 6.4 Availability of the foods

Table 3 lists the foods collected in FACS and their availability in community stores and the supermarket chains. The major supermarket chains had the best availability of foods unless the particular brand selected on FACS wasn't carried in that chain. The smaller stores had less availability due to lack of space in store or not having the product due to customers not buying it.

The community stores had the greatest number of foods not available with many stores not having fresh fruit or vegetables available when surveyed. This maybe due to the timing of the survey and deliveries, lack of space, the perishability of the produce or no desire by customers – e.g. one store didn't carry low fat dairy since it didn't sell.

Seasonal fruits such as plums and grapes were only available in 4 and 8 stores respectively. This highlights the need to ensure the seasonality of fruit on the FACS and that the fruit included in future surveys is in season at the time of the survey.

**Table 10: Food availability by chain – number of stores where food item was not available**

<i>Total diet food group</i>	<i>Food</i>	<i>Community store</i> (n=48)	<i>Chain A</i> (n=29)	<i>Chain B</i> (n=29)	<i>Chain C</i> (n=48)	<i>Total all stores</i> (n=144)
<b>Cereals - refined</b>	BBQ Shapes	7	3	0	4	14
	Crumpets	33	0	1	6	40
	Fast (Microwaveable) Rice	34	1	1	5	41
	Instant Noodles	11	2	0	1	14
	Kellogg's Coco Pops	23	0	0	1	24
	Kellogg's Corn Flakes	9	0	0	1	10
	Kellogg's Froot Loops	27	0	0	2	29
	Kellogg's Nutri-Grain	12	0	0	1	13
	Kellogg's Sultana Bran	29	0	1	0	30
	Noodle Bowl	29	3	1	10	43
	Pita Bread, White	35	3	6	24	68
	Plain Flour, White	6	1	0	1	8
	Ritz Cracker Original	37	9	4	10	60
	Sao Biscuits	20	2	1	10	33
	Spaghetti	7	0	0	1	8
	Uncle Toby's Cheerios	36	3	3	20	62
	Uncle Toby's Plus Sports Lift	38	2	4	18	62
White Sandwich Loaf, Sliced	6	0	0	2	8	
Wholemeal Sandwich Loaf, Sliced	12	0	1	2	15	
<b>Cereals - whole-grain</b>	Bread Rolls, Wholegrain	32	4	9	30	75
	Brown Rice	27	0	1	3	31
	English Muffins, Wholemeal	36	1	3	17	57
	Fibre Enriched Sandwich Loaf, Sliced	37	1	2	12	52
	Multigrain Sandwich Loaf, Sliced	22	0	1	4	27
	Plain Flour, Wholemeal	31	2	0	7	40
	Rolled Oats	4	0	0	0	4
	Spaghetti, Wholemeal	36	10	4	13	63
	Wheat Biscuits	0	1	0	0	1
	White Rice	5	0	0	0	5
<b>Cigarettes &amp; tobacco</b>	Drum Blue Tobacco (Roll Your Own)	23	3	1	10	37
	Winfield Blue (25 pack)	5	2	0	5	12
<b>Dairy higher fat</b>	Cheese Full Fat Cheddar	14	0	0	0	14
	Dip Tzatziki	35	1	2	22	60
	Parmesan Cheese	28	1	2	8	39
<b>Dairy lower fat</b>	Flavoured Milk	27	2	1	5	35
	Fresh Reduced Fat Milk	32	0	0	2	34
	Milk Longlife Reduced Fat (2%)	18	0	0	0	18

<i>Total diet food group</i>	<i>Food</i>	<i>Community store</i> (n=48)	<i>Chain A</i> (n=29)	<i>Chain B</i> (n=29)	<i>Chain C</i> (n=48)	<i>Total all stores</i> (n=144)
	Powdered Skim Milk	34	0	0	6	40
	Ricotta	37	3	4	25	69
	Yoghurt Flavoured Low Fat	28	1	0	3	32
	Yoghurt Flavoured Low Fat Small	25	1	0	0	26
	Yoghurt Vanilla Low Fat	31	1	0	12	44
<b>Dairy medium fat</b>	Cheese Reduced Fat Cheddar	26	2	0	9	37
	Cheese Slices	16	0	0	1	17
	Cheese, Cream, Light	28	0	2	8	38
	Custard, Vanilla	34	1	1	13	49
	Fresh Full Cream Milk	20	0	0	0	20
	Milk Longlife Full Cream	3	0	0	0	3
	Powdered Full Cream Milk	0	0	0	2	2
	Soy Milk Reduced Fat	31	0	0	2	33
<b>Discretionary - cereals refined</b>	- Milk Arrowroot	18	3	1	3	25
	Oreo	36	3	3	9	51
	Spicy Fruit Roll	36	9	9	16	70
	Tim Tam Original	20	1	2	2	25
<b>Discretionary - condiments</b>	Baking Powder	6	7	8	5	26
	Cayenne Pepper	38	1	4	32	75
	Cinnamon, Ground	35	0	1	35	71
	Cornflour	16	2	0	2	20
	International Roast	25	0	0	3	28
	Nescafe Blend 43	5	1	0	0	6
	Paprika Ground	38	0	1	31	70
	Parsley Flakes	38	1	2	31	72
	Thyme Leaves	38	1	3	32	74
	Vegetable Stock	36	13	9	26	84
<b>Discretionary confectionery</b>	- Allens Minties	24	2	0	6	32
	Cherry Ripe	19	1	1	4	25
	Chewing Gum	16	4	0	13	33
	Chocolate Block, Milk	16	1	0	2	19
	Kellogg's Lcms Rice Bubbles	34	1	2	8	45
	Kellogg's Nutri-Grain Original Bars	37	4	3	8	52
	Mars Bar	16	0	0	3	19
	Natural Confectionery Company Snakes	31	1	0	6	38
	Nestle Milo Energy Snack Bars	36	2	3	11	52
	Nutella	17	0	0	5	22
	Pascall Marshmallows	30	1	0	6	37
	Snickers	24	2	0	4	30
	Uncle Toby's Roll Ups, Strawberry	32	3	3	19	57
<b>Discretionary - fat</b>	Canola Oil	8	0	0	1	9
<b>Discretionary - fried</b>	Frozen Fish Crumbed	23	0	1	2	26

<i>Total diet food group</i>	<i>Food</i>	<i>Community store</i> (n=48)	<i>Chain A</i> (n=29)	<i>Chain B</i> (n=29)	<i>Chain C</i> (n=48)	<i>Total all stores</i> (n=144)
<b>Discretionary - fruit drink</b>	Fruit Drink	32	7	1	12	52
<b>Discretionary - juice drink</b>	Juice, Lunch Box	27	2	0	5	34
<b>Discretionary - meat</b>	Sausages	6	1	1	8	16
	Sliced Ham	24	1	2	12	39
<b>Discretionary - prepared meal</b>	Frozen Healthy Meal Beef Lasagne	28	0	0	10	38
	Frozen Meat Pies	32	0	0	1	33
	Frozen Pizza	15	0	0	6	21
	Instant Pasta & Sauce – Alfredo	23	5	6	7	41
	Packet Cup Soup, Chicken Noodle	16	1	0	3	20
	Prepared Pasta - Ravioli Beef	36	0	2	12	50
	Taco Complete Dinner Kit (Inc. Sauce)	30	3	3	4	40
<b>Discretionary - saturated fat</b>	Butter	23	0	0	0	23
	Butter Blend	25	0	0	3	28
	Butter Blend, Reduced Salt	38	5	4	14	61
	Butter, Reduced Salt	32	0	1	14	47
	Olive Oil	24	0	0	1	25
	Sunflower Oil	31	1	0	7	39
<b>Discretionary - sauces</b>	Mayonnaise, Fat Free	19	1	0	4	24
	Milo	9	0	0	0	9
	Pasta Sauce	6	0	0	0	6
	Soy Sauce	6	2	0	3	11
	Stir Fry & Simmer Sauce	30	3	2	12	47
	Tomato Sauce	14	1	0	1	16
<b>Discretionary - savoury snacks</b>	Canned Corned Beef	3	4	0	7	14
	Canned Spaghetti	0	1	0	2	3
	Dorito's Cheese Supreme	31	1	0	7	39
	Frozen Chips	21	0	0	2	23
	Frozen Potato Smiles	37	5	29	24	95
	Smiths Crinkle Original	17	1	1	5	24
<b>Discretionary - soft drink</b>	Coca-Cola (1.25l)	7	1	0	4	12
	Coca-Cola (600ml)	12	2	2	3	19
	Coca-Cola (bulk can packs)	35	4	1	10	50
	Coca-Cola Zero (1.25l)	6	0	0	3	9
	Cordial, Lime	13	1	1	4	19
	Diet Cordial, Lime	31	3	4	15	53
	Gatorade (600ml)	31	9	13	25	78
	Pepsi Cola (1.25l)	33	1	0	9	43
	Pepsi Max Cola (1.25l)	33	0	0	10	43
	Powerade (600ml)	18	1	2	9	30
	Red Bull (250ml)	35	5	5	16	61
	Schweppes Diet Lemonade (1.25l)	34	4	4	22	64
	Schweppes Lemonade (1.25l)	28	0	0	7	35
	V Energy Drink (250ml)	37	6	13	21	77



<i>Total diet food group</i>	<i>Food</i>	<i>Community store</i> (n=48)	<i>Chain A</i> (n=29)	<i>Chain B</i> (n=29)	<i>Chain C</i> (n=48)	<i>Total all stores</i> (n=144)
<b>Discretionary - spreads</b>	Honey	18	0	1	2	21
	Jam Strawberry	6	0	1	1	8
	Vegemite	9	0	0	2	11
<b>Discretionary - sweets</b>	Brown Sugar	20	1	0	4	25
	Cake Mix, Chocolate	12	2	0	1	15
	Ice Cream, Vanilla, Low Fat	22	0	0	8	30
	Muffin Mix, Chocolate Chip, (Low Fat)	35	3	4	13	55
	Nanna's Apple Pie (Family Size)	32	0	3	13	48
	Nestle Milo	32	0	2	11	45
	Ovaltine	38	4	1	9	52
	Sara Lee Strawberry Cheesecake	23	2	2	13	40
	White Sugar	8	0	0	1	9
<b>Discretionary - tea</b>	Tea Bags	1	0	0	0	1
<b>Discretionary - unsaturated fat</b>	Cooking Spray	22	3	11	26	62
	Margarine, Canola	8	0	0	2	10
<b>Fruit</b>	Apples Green	15	1	0	0	16
	Apples Red	2	0	0	0	2
	Bananas	10	3	6	7	26
	Canned Apple Pie Filling	34	6	6	17	63
	Canned Fruit Salad	9	0	1	2	12
	Canned Peaches	9	0	1	3	13
	Canned Pineapple Slices	12	0	1	2	15
	Grapefruit	35	4	5	21	65
	Grapes	34	28	29	45	136
	Kiwi Fruit	21	0	1	1	23
	Lemons	9	0	1	4	14
	Mandarins	14	20	13	8	55
	Melon Honeydew	32	5	9	22	68
	Melon Rockmelon	23	4	5	6	38
	Melon Watermelon Seedless	24	11	2	14	51
	Orange Juice, 100%	23	0	0	6	29
	Oranges	5	0	0	1	6
	Pears	14	1	1	1	17
	Pineapple	36	1	3	15	55
Plums	35	29	29	47	140	
<b>Meat &amp; alternatives - fish</b>	Canned Pink Salmon	24	2	0	2	28
	Canned Tuna Large	21	1	0	2	24
	Canned Tuna Small	4	1	0	2	7
	Frozen Fish Fillets	30	15	11	13	69
	White Fish	27	4	4	24	59
<b>Meat &amp; alternatives - other</b>	Canned Meat And Vegetables	3	3	0	8	14
	Eggs	7	0	1	5	13
	Nobby's Peanuts, Salted	26	5	1	12	44

<i>Total diet food group</i>	<i>Food</i>	<i>Community store</i> (n=48)	<i>Chain A</i> (n=29)	<i>Chain B</i> (n=29)	<i>Chain C</i> (n=48)	<i>Total all stores</i> (n=144)
	Peanut Butter	13	2	0	3	18
	Peanut Butter (No Added Salt)	33	11	8	32	84
<b>Meat &amp; alternatives - poultry</b>	Chicken Drumsticks	29	2	0	13	44
	Chicken Fillets	16	1	0	9	26
	Whole Chicken	18	0	0	14	32
<b>Meat &amp; alternatives - red meat</b>	Beef Mince Lean	34	0	1	18	53
	Beef Mince Medium	31	7	6	31	75
	Beef Mince Regular	12	1	2	18	33
	Kangaroo Mince	38	17	9	43	107
	Kangaroo Steak	36	12	9	41	98
	Kangaroo Tail	21	29	29	46	125
	Lamb Chops	13	2	0	12	27
	Leg Of Lamb	22	2	1	19	44
	Pork Chops	25	2	0	12	39
	Rump Steak Lean	36	21	18	39	114
	Rump Steak Regular	24	1	0	12	37
	Veal	38	7	7	33	85
<b>Nuts and seeds</b>	Almonds	36	0	3	7	46
	Peanuts	35	4	5	11	55
<b>Other</b>	Follow On, 6 To 12 Months (Step 2)	24	2	1	5	32
	Newborn, Up To 6 Months (Step 1)	19	1	0	3	23
	Toddler, 12 To 36 Months (Step 3)	32	3	2	16	53
<b>Vegetables - brassica</b>	Broccoli	14	1	1	1	17
<b>Vegetables - cruciferous</b>	Cabbage	5	0	1	1	7
	Cauliflower	9	0	1	0	10
<b>Vegetables - green</b>	Canned Peas	8	0	0	0	8
	Frozen Mixed Vegetables	11	0	0	2	13
	Frozen Peas	11	0	0	3	14
	Frozen Spinach	38	6	2	39	85
	Green Beans	31	4	0	5	40
	Lettuce Cos	31	3	2	11	47
	Lettuce Iceberg	15	0	1	3	19
	Silverbeet	27	3	4	14	48
	Soup Pack Vegetable	18	13	6	10	47
	Spinach	33	5	2	12	52
	Summer Salad Mix	34	8	5	21	68
<b>Vegetables - legumes</b>	Canned Baked Beans	0	1	0	3	4
	Canned Chick Peas	34	3	1	3	41
	Canned Four Bean Mix	20	1	0	2	23
	Canned Red Kidney Beans	16	1	0	2	19
<b>Vegetables - mixed</b>	Steam Fresh Mixed Vegetables	28	2	0	9	39
<b>Vegetables - orange</b>	Carrots	7	0	0	0	7
	Pumpkin	9	0	2	1	12

<i>Total diet food group</i>	<i>Food</i>	<i>Community</i>	<i>Chain</i>	<i>Chain</i>	<i>Chain</i>	<i>Total</i>
		<i>store</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>all</i>
		(n=48)	(n=29)	(n=29)	(n=48)	(n=144)
<b>Vegetables - other</b>	Asparagus	36	4	6	21	67
	Avocado	13	2	0	4	19
	Canned Sliced Beetroot	9	0	0	1	10
	Canned Tomatoes	16	0	0	2	18
	Capsicum Green	13	1	1	1	16
	Capsicum Red	8	0	0	1	9
	Celery	19	0	0	0	19
	Cucumber	12	3	6	2	23
	Eggplant	31	3	2	10	46
	Garlic	14	2	1	4	21
	Leek	31	2	2	3	38
	Mushrooms	17	2	0	3	22
	Onions	3	0	0	0	3
	Parsley Fresh	37	5	4	19	65
	Tomatoes	5	0	0	2	7
	Tomatoes Cherry	23	2	2	4	31
	Tomatoes Grape	36	4	2	19	61
Tomatoes Roma	36	3	2	13	54	
Zucchini	24	1	6	4	35	
<b>Vegetables - starchy</b>	Canned Creamed Corn	16	1	0	1	18
	Potatoes	5	0	0	2	7
	Sweet Potato	20	0	2	4	26
<b>Water</b>	Frantelle Natural Spring Water (600ml)	28	25	21	29	103
	Mt Franklin Spring Water Natural (600ml)	25	3	2	16	46

### 6.5 Energy density and food costs

The association between energy density and food cost per kilogram was explored across all foods. Fats and oils, sugars and nuts were cheapest and had the highest energy density per kilogram. Vegetables, fruits, meats, poultry, fish etc which were more expensive and less energy dense. The cheapest foods were the most energy dense.

### 6.6 Quality of fruit, vegetables and meats

The quality of fresh fruits and vegetables instrument for supply to a select number of recent vegetables and meat. Fruits and vegetables were identified as either good or poor quality. The quality assessment tool was able to distinguish between the quality of fruits and vegetables. Celery, green beans, lettuce, brown onions, oranges and tomatoes were reported to be of poorer quality in 50% of the stores. The proportion of stores who had fruits and vegetables the sale that were good quality was determined.

Overall, the quality of fresh fruits and vegetables was lower in remote areas. The major supermarket chains in the metropolitan areas were assessed to have better quality of fruits and vegetables and community stores with the exception of brown onions, oranges and lettuce.

Overall across all foods, the relationship between price of fruits and vegetables and quality was not highly correlated.

Overall the mean quality score for specific fruits and vegetables was highest for the Perth metropolitan area. Green apples, carrots, potatoes and tomatoes had the highest quality scores in the Perth metropolitan area. In inner regional bananas, broccoli, carrots, and potatoes had the highest mean score. The highest scores overall were found in an outer regional areas for broccoli, carrots, green beans and tomatoes. Green apples and oranges had a high mean a quality rating in remote areas. All fruits and vegetables had a lower mean quality rating in very remote areas.

**Table 11: Mean quality score for produce by remoteness category**

Produce	Perth	Inner regional	Outer regional	Remote	Very remote
Apples Green	93.3	94.5	95.5	94.3	85.7
Apples Red	90.7	86.9	93.3	91.8	87.4
Bananas	90.5	97.0	90.5	80.4	69.3
Broccoli	90.5	94.9	99.1	87.5	89.6
Carrots	95.0	96.7	99.2	90.7	84.1
Celery	86.6	90.1	94.0	79.3	70.8
Green Beans	83.6	86.5	95.1	68.1	70.0
Lettuce	78.6	86.1	93.0	72.5	68.1
Onions Brown	86.7	86.5	86.8	86.0	75.4
Oranges	83.8	90.7	86.3	92.0	87.8
Pears	88.3	84.6	87.5	86.9	86.1
Potatoes	92.2	95.2	93.1	85.9	86.0
Tomatoes	92.2	92.3	95.1	76.0	72.7


### 6.7 Top 25 Best Selling foods

It was not possible to determine the top 25 best selling foods per supermarket. This information requires provision of sale data by the supermarkets or grocery chain. It may be that this information is considered commercially sensitive; however the nature of the food access and costing survey is that Chains and individual stores are de-identified and results are presented in this manner. This information is available on a cost basis through some sources. Anecdotal results, and information provided by a small number of community stores demonstrate the benefit of having this information. In stores where junk food represent a major proportion of the top 25 bestselling food products, health promotion interventions can intervene. It is recommended that negotiation continue with grocery chains to pursue de-identified information on the top 25 bestselling foods for health promotion purposes.

## 7. Recommendations

People in Western Australia living in remote areas are at a disadvantage when it comes to affordability and access to healthy food. Food pricing in Western Australia is associated with geographic location, with remote areas paying more for all foods. This increase is across all foods, however, greater for healthier core foods.

Monitoring food prices for health purposes will provide evidence to support intervention development aimed at increasing the promotion, sale and consumption of foods consistent with dietary recommendations.



Further analysis is recommended to develop an optimal food basket for health to compare with a current consumption basket.

The FACS pilot in Western Australia met its objectives to:

1. Calculate the cost of a household basket of foods consistent with Australian Dietary Guidelines and to compare the cost and availability of this basket by geographic location, socio-economic status and remoteness.
2. Calculate the energy density and energy cost relationship between foods.
3. Compare the weekly cost of a basket of food consistent with Australian Dietary Guidelines as a percentage of weekly income for a reference family.
4. Map the main grocery stores servicing the Western Australian community by socio-economic status and remoteness classification.
5. Compare the quality and availability of fresh foods (i.e. fresh meat, fruit and vegetables) by geographic location and socio-economic status

The FACS was unable to identify the top 25 best selling foods.

The food pricing and quality survey is likely to be useful for nutrition promotion purposes, however further research, information and partnerships are required to achieve this end. In particular, negotiation with the grocery retail industry is required to identify how access and pricing influences the food choice in relation to the promotion, pricing and quality of foods.

Key recommendations include:

1. Improve supply chain logistics to reduce the cost of food to the consumer, particularly for remote communities as community stores often are the main daily food source for the community.
2. Conduct a Food Access and Pricing Survey annually in Western Australia –this will enable ongoing monitoring of food pricing for health purposes and build the capacity to conduct routine surveys.
3. Develop a national food access and pricing survey –to support policy initiatives to promote food security.
4. Formalise partnerships between government, food retail industry, and appropriate academic institutions to explore food access and pricing influences on health.
5. Negotiate to identify the top 25 best selling foods to inform the development of nutrition interventions
6. Continue to develop and refine the objective assessment of quality of fresh food at point of sale.

## References

1. Dept. of Health and Families. Northern Territory Market Basket Survey 2008. Darwin: Department of Health and Families, Northern Territory Government; 2008.
2. Queensland Health. The 2006 Healthy Food Access Basket Survey. Brisbane: Queensland Health; 2007.
3. Queensland Health. The 2000 Healthy Food Access Basket Survey. Brisbane: Queensland Health; 2000.
4. National Health and Medical Research Council. Dietary Guidelines for Older Australians. Canberra: Commonwealth of Australia; 1999.
5. National Health and Medical Research Council. Dietary Guidelines for Children and Adolescents in Australia incorporating the Infant Feeding Guidelines for Health Workers. Canberra: Commonwealth of Australia; 2003.
6. National Health and Medical Research Council. Dietary Guidelines for Australian Adults. Canberra: Commonwealth of Australia; 2003.
7. Clemons R, Choice. Supermarket price survey 2009. [Web page] 2009 [cited; Available from: <http://www.choice.com.au/Reviews-and-Tests/Food-and-Health/Food-and-drink/Supermarkets/Supermarket-price-survey-2009/page/Introduction.aspx>
8. Oakenfull D, Choice. Breakfast cereal review. 2009 [cited; Available from: <http://www.choice.com.au/Reviews-and-Tests/Food-and-Health/Food-and-drink/Groceries/Breakfast-cereal-review-and-compare/Page/Introduction.aspx>
9. Choice Magazine. Food for kids. 2010 [cited; Available from: <http://www.choicefoodforkids.com.au/page/our-criteria>
10. Nielson. The Nielson Australia Website. 2010 [cited; Available from: <http://au.nielsen.com/site/index.shtml>
11. Melbourne Market Authority. MarketFresh. 2006 [cited; Available from: <http://www.marketfresh.com.au/mf.asp>
12. Aus-Meat. AusMeat Home Page. 2007 [cited; Available from: <http://www.ausmeat.com.au/>
13. Australian Bureau of Statistics. Census Geography Paper 03/01 - ASGC Remoteness Classification - Purpose and Use. 2003 [cited; Available from: <http://www.abs.gov.au/Websitedbs/D3110122.NSF/4a255eef008309e44a255eef00061e57/f9c96fb635cce780ca256d420005dc02!OpenDocument>
14. Harrison M, Lee A, Findlay M, Nicholls R, Leonard D, Martin C. The increasing cost of healthy food. Australian and New Zealand Journal of Public Health. 2010;34(2):179-86.
15. Australian Bureau of Statistics. Information Paper: An Introduction to Socio-Economic Indexes for Areas (SEIFA), 2006 (cat.no. 2039.0). 2008 [cited; Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/2039.0/>
16. National Statistical Service. Sample Size Calculator. 2010 [cited; Available from: <http://www.nss.gov.au/nss/home.nsf/NSS/0A4A642C712719DCCA2571AB00243DC6?opendocument>

- 
17. SAS (Statistical Analysis Software) Enterprise Guide. 4.2 ed. Cary, NC, USA: SAS Institute Inc.; 2006-2008.
  18. Landrigan T. Food Access and Cost Survey Google Group. 2010.
  19. Australian Bureau of Statistics. Regional Population Growth, Australia, 2008-09 (cat. no. 3218.0). 2010.
  20. Australian Bureau of Statistics. Experimental Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2006 (cat. no. 3238.0.55.001). 2008.
  21. Australian Bureau of Statistics. Experimental Estimates of Personal Income for Small Areas, Time Series, 2003-04 to 2007-08 (cat. no. 6524.0.55.002 ). 2010.
  22. Australian Bureau of Statistics. Household Income and Income Distribution 2007-08, Australia (cat. no. 6523.0), Table 11A. 2009.
  23. Centrelink: Commonwealth Department of Human Services. Centrelink Rate Estimators. 2010 [cited 2010 November]; Available from: <http://www.centrelink.gov.au/https/RateEstimatorsWeb/publicUserCombinedStart.do>
  24. Kettings C, Sinclair A, Voevodin M. A healthy diet consistent with Australian health recommendations is too expensive for welfare-dependent families. Australian & New Zealand Journal of Public Health. 2009;33:566-72.
  25. Brownell KD, Warner KE. The Perils of Ignoring History: Big Tobacco Played Dirty and Millions Died. How Similar Is Big Food? The Milbank quarterly. 2009;87(1):259-94.

## Appendices

### Appendix 1: Milestones and key dates

	Start Date	End (due) Date	Comments
Project start	15/03/2010	15/03/2010	
Literature review	15/03/2010	—	Ongoing as new articles and research are identified
Consultation	23/03/2010	—	Ongoing as required. Meetings with ABS staff on availability of scanner data, process for collecting CPI prices and assistance with sampling of supermarkets.
Draft basket & foods to be collected	31/03/2010	12/05/2010	Draft basket developed for feedback from other jurisdictions
Draft instructions for collecting prices	16/04/2010	21/05/2010	Draft instructions developed to be used with skirmish in Perth supermarkets.
Justification for contents of basket	16/04/2010	12/05/2010	Justification included in email sent to stakeholders
Justification for survey methodology	16/04/2010	—	In progress
Feedback from other jurisdictions	13/05/2010	25/05/2010	
Status report		28/05/2010	Monthly update report
Finalise basket and instructions	—	04/06/2010	
Develop questionnaire	31/03/2010	04/06/2010	Includes instructions
Develop survey sampling methodology	30/04/2010	15/07/2010	
Pilot FACS in Perth supermarkets	28/05/2010	04/06/2010	One IGA and one Woolworths
Quality measure instrument	30/06/2010	31/07/2010	Developed in conjunction with Joanna Whiteford from Curtin University
Status report		30/07/2010	Monthly update report
Training of collectors	30/06/2010	06/08/2010	Google group setup and training material uploaded.
Develop user manual	30/06/2010	24/12/2010	
Price collection in store	09/08/2010	30/08/2010	Collection of data may continue in remote Indigenous community stores
Status report		31/08/2010	Monthly update report
Data entry into SAS	07/09/2010	30/09/2010	Two days per week
Data analysis framework	01/09/2010	30/09/2010	
Data analysis	01/09/2010	19/12/2010	
FaHCSIA report	18/10/2010	14/12/2010	Includes individual reports for each community store
Final report		22/12/2010	



## Appendix 2: Stakeholder group

Name	Title & Organisation	Name	Title & Organisation
Janis Baines	Director, Population Health Strategy Unit, Department of Health and Ageing	Deborah Kerr	Associate Professor, Director of Research, School of Public Health, Faculty of Health Sciences, Curtin University of Technology
Kylie Ball	Associate Professor, School of Exercise and Nutrition Sciences, Deakin University	Dr Amanda Lee PhD, BSc(Nutr), GradDipDiet	Manager, Nutrition and Physical Activity, Health Promotion Branch, Queensland Health
Andrea Begley	FANSIG National Co-convenor (PHAA) Lecturer, School of Public Health, Faculty of Health Sciences, Curtin University of Technology	Dympna Leonard MPH, BSc(Diet)	Public Health Nutritionist, Early Life Indigenous Nutrition & Growth (ELING), Cairns Public Health Unit, Tropical Regional Services, Division of the Chief Health Officer, Queensland Health
Robyn Bowcock,	Public Health Nutritionist, Department of Health, Western Australia  WA Country Health Services, Population Health Unit, Kimberley	Dr Dorothy Mackerras	Chief Public Health Nutrition Advisor, Food Standards Australia New Zealand, (FSANZ)
Cate Burns	WHO Collaborating Centre for Obesity Prevention, Faculty of Health, Medicine, Nursing and Behavioural Sciences, Deakin University	Claire Palermo	Nutrition and Dietetics Department, Faculty of Medicine Nursing and Health Sciences, Monash University, Victoria.
John Coveney	Public Health, Flinders University	Judy Seal	Department of Health and Human Services, Tasmania
		Carrie Turner	Nutrition Policy Officer, Nutrition and Physical Activity Program, Department of Health and Families, Northern Territory

### Appendix 3: Literature review

- Burns, C. and S. Friel, *It's time to determine the cost of a healthy diet in Australia*. Australian and New Zealand Journal of Public Health, 2007. **31**(4): p. 363-365.
- Burns, C., et al., *Food cost and availability in a rural setting in Australia*. Rural and Remote Health, 2004. **4**(4).
- Carlson, A., et al., *Thrifty Food Plan, 2006*. 2007, Center for Nutrition Policy and Promotion.
- Dept. of Health and Community Services, *Northern Territory Market Basket Survey 2006*. 2007, Department of Health and Families, Northern Territory Government: Darwin.
- Dept. of Health and Community Services, *Northern Territory Market Basket Survey 2007*. 2007, Department of Health and Families, Northern Territory Government: Darwin.
- Dept. of Health and Families, *Northern Territory Market Basket Survey 2008*. 2008, Department of Health and Families, Northern Territory Government: Darwin.
- Drewnowski, A., *Poverty and obesity: the role of energy density and energy costs*. The American Journal of Clinical Nutrition, 2004. **79**(1): p. 6.
- Drewnowski, A., *Concept of a nutritious food: toward a nutrient density score*. The American Journal of Clinical Nutrition, 2005. **82**(4): p. 721.
- Drewnowski, A., *Food choices and diet costs: an economic analysis*. The Journal of Nutrition, 2005. **135**(4): p. 900.
- Drewnowski, A.P. and A.M.P.H.R.D.R.D.H. Barratt-Fornell, *Do Healthier Diets Cost More?*
- Guenther, P.M., et al., *Development and Evaluation of the Healthy Eating Index-2005: Technical Report*. 2007, Center for Nutrition Policy and Promotion.
- Harrison, M., et al., *The increasing cost of healthy food*. Australian and New Zealand Journal of Public Health, 2010. **34**(2): p. 179-186.
- Ketting, C., A.J. Sinclair, and M. Voevodin, *A healthy diet consistent with Australian health recommendations is too expensive for welfare-dependent families*. Australian and New Zealand Journal of Public Health, 2009. **33**(6): p. 566-572.
- Lee, A.J., et al., *Food availability, cost disparity and improvement in relation to accessibility and remoteness in Queensland*. Aust N Z J Public Health, 2002. **26**(3): p. 266-72.
- Lee, A.J., et al., *Improving Aboriginal and Torres Strait Islander nutrition and health*. Medical Journal of Australia, 2009. **190**(10): p. 547-548.
- McIntyre, J., *Market Basket Survey, Sydney, June 2006*. 2006, Sydney Food Fairness Alliance: Sydney.
- Meedeniya, J., A. Smith, and P. Carter, *Food supply in rural South Australia : a survey on food cost, quality and variety*. 2000, Eat Well SA: Adelaide.
- Ministry of Health, *Food and Nutrition Monitoring Report*. 2006, Ministry of Health: Wellington.
- Palermo, C. and A. Wilson, *Development of a healthy food basket for Victoria*. Aust N Z J Public Health, 2007. **31**(4): p. 360-3.
- Palermo, C.E., et al., *The cost of healthy food in rural Victoria*. Rural and remote health, 2008. **8**(4): p. 1074-1074.

- Queensland Health, *The 2000 Healthy Food Access Basket Survey*. 2000, Queensland Health: Brisbane.
- Queensland Health, *The 2006 Healthy Food Access Basket Survey*. 2007, Queensland Health: Brisbane.
- Reedy, J., S.M. Krebs-Smith, and C. Bosire, *Evaluating the Food Environment: Application of the Healthy Eating Index-2005*. American Journal of Preventive Medicine, 2010. **38**(5): p. 465-471.
- Seal, J., *Monitoring the price and availability of healthy food -- time for a national approach?* Nutrition & Dietetics, 2004. **61**(4): p. 197-199.
- Stubbs, C.O. and A.J. Lee, *The obesity epidemic: both energy intake and physical activity contribute*. Medical Journal of Australia, 2004. **181**(9): p. 489-491.
- Treuhaft, S. and A. Karpyn, *The Grocery Gap: Who has access to healthy food and why it matters*. 2010, PolicyLink and The Food Trust.
- Tsang, A., et al., *Adelaide healthy food basket: a survey on food cost, availability and affordability in five local government areas in Metropolitan Adelaide, South Australia*. Nutrition & Dietetics, 2007. **64**(4): p. 241-247.
- Williams, P., *Trends in affordability of the Illawarra Healthy Food Basket 2000-2007*. Nutrition & Dietetics, 2009. **66**(1): p. 27.
- Williams, P., Y. James, and J. Kwan, *The Illawarra Healthy Food Price Index 2. Pricing methods and index trends from 2000-2003*. Nutrition & Dietetics, 2004. **61**(4): p. 208-214.
- Williams, P., M. Reid, and K. Shaw, *The Illawarra Healthy Food Price Index 1. Development of the Food Basket*. Nutrition & Dietetics, 2004. **61**(4): p. 200-207.



Delivering a **Healthy WA**