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The Illawarra Healthy Food Price Index. 1. Development of the food basket

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Keywords

food security, food prices, dietary guidelines, healthy food basket

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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Title: **The Illawarra Healthy Food Price Index.
1. Development of the food basket**

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Nutritional adequacy of the food basket as determined by comparison with recommended numbers of serves from the AGHE, the RDIs for the reference family and other quantified targets related to the Dietary Guidelines for Australians.

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Conclusion

The IHFB represents a nutritionally adequate weekly basket of foods for a reference family of five that can be used to monitor changes in the affordability of healthy food.

Introduction

Limited income is known to be a barrier to obtaining the goods needed for optimal health (1) and low income families spend a greater proportion of their income on food (2). Food insecurity is strongly inversely associated with household and per capita income (3) and it has been estimated that the level of food insecurity as a consequence of limited resources is over 5% in the general Australian population (4). This problem has been recognised as a priority in the Eat Well Australia national nutrition strategy (5). A number of studies suggest that lower socio-economic families have diets that are less likely to comply with dietary guidelines (6-9), although this is not a consistent finding (10-13).

Differences in food prices between standard and healthier alternative products are thought to influence consumer choices, especially among the socioeconomically disadvantaged (14, 15). Several Australian studies have concluded that a healthy diet can be more expensive unless significant changes are made to normal food patterns (16-21). Similar findings have been reported in other countries (22-27). However there is currently little information about trends in the cost of a healthy diet over time in Australia.

Canada officially standardised a national food basket in 1995 that is used to monitor the cost of an adequate diet (28). It acts as a template for each province to adopt as a costing tool to reflect provincial differences in food availability, and many provinces update the costing annually (29, 30). Australia has no similar program for monitoring the cost of healthy food. The Australian Bureau of Statistics (ABS) regularly monitors changes in the price of a basket of household goods, including food, to calculate the quarterly Consumer Price Index (CPI), but the foods are selected to represent typical purchases of Australians in the capital cities only, rather than being based on a basket of healthy food choices (31).

In Australia there is no single accepted definition of the foods required to make up a healthy diet. The Core Food Groups (32) provide a number of models of possible food groupings to provide a diet that meets recommended dietary intakes (RDI) (33). Based on this the Australian Guide to Healthy Eating (AGHE) offers two sets of recommendations on the number of serves from different food groups needed to create a diet consistent with the

RDI and national dietary guidelines (34). Electronic searches of medical and nutrition databases, hand searching of Australian nutrition journals and personal contact with key researchers found that a number of groups in Australia have defined baskets of foods for a variety of research purposes, which are summarised in Table 1.

For many of these baskets the method of selection of the foods is not clearly detailed and not all attempt to be either nutritionally complete or to conform to dietary guidelines. For over ten years the Kimberley Market Basket Survey has been used to monitor food prices in remote Western Australian Aboriginal communities, but it does not use a healthy selection of foods (35-38). Some of the baskets that have aimed to specify healthier food options were developed for cross-sectional surveys of the availability, accessibility and quality of food, particularly in remote areas, rather than to monitor price changes longitudinally (39-41). In 1996 a group of nutritionists from the Northern Territory, Queensland and Western Australia began a project to develop a basket survey to monitor food quality, variety and cost in Aboriginal communities across all of northern Australia (42). This work became the foundation for the most comprehensively developed Australian food basket - the Queensland Healthy Food Access Basket (HFAB). It was piloted in north Queensland in early 1997 before a statewide survey in 1998, and has been repeated in 2000 and 2001, allowing trend analysis of the costs of healthy foods in that state (43-46). The basket used in the later Eat Well SA study (47) was based on the HFAB. These last two approaches have informed the methods adopted in this study.

The aim of this project was to establish an ongoing survey of the affordability of a basket of healthy food items in another region of Australia, and to publish a regular index showing changes in the cost of the basket over time, compared to changes in average income levels and available social welfare benefits. This paper (Part 1) describes the methods used to define the foods included in the food basket used for the Illawarra Healthy Food Price Index (IHFPI). The accompanying paper (Part 2) describes the costing methods used and presents results from the first three years of monitoring.

The Illawarra region, centred on Wollongong, stretches along the NSW coast from Stanwell Park just south of Sydney to Gerroa, just north of Nowra. It was chosen for this monitoring

project for two reasons. The Illawarra is a socially diverse, non-metropolitan area, with a higher proportion of people who are unemployed or on low incomes (compared to the NSW average) and with high rates of cardiovascular disease and cancer (48). Secondly it is convenient to use dietetic students at the University of Wollongong to undertake regular monitoring of food prices for the IHFPI.

Methods

Our aim was to define a weekly basket of foods that would not only be healthy and nutritionally adequate but also socially acceptable for a family living in the Illawarra region of NSW. The process of the food basket development consisted of five stages:

- 1) Definition of a reference family
- 2) Selection of food groups and serves required for each family member
- 3) Selection of a draft basket of foods
- 4) Adjustment of foods selected to comply with nutritional guidelines
- 5) Nutritional analysis of the basket and specification of quantities to meet nutritional targets.

Definition of a reference family

A reference family was chosen to reflect the age and sex characteristics of residents of the Illawarra region and include individuals with varying nutritional needs. Data from the ABS report on Population by Age and Sex (1999) was used to determine the age groups representing the greatest proportions of the Wollongong population (49).

The reference family consists of the following five individuals:

- 5 year old male
- 15 year old female
- 39 year old male
- 39 year old female
- 65 year old female.

Selection of food groups and serves required for each family member

In the development stage of the food basket, the AGHE recommendations for both core food groups and 'extras', were used to generate a template for the basket (34). Using the food pattern of Example B in the AGHE (which incorporates a higher proportion of meat than Example A) the number of serves required for each food group by the adult male in the family were used as the minimum number of different food types chosen for the basket from each of the food groups. For example, according to the AGHE three to four serves of

fruit are recommended for the adult males, so at least four different kinds of fruit were included in the basket to ensure variety.

Selection of draft basket of foods

Data from the 1995 National Nutrition Survey (NNS) were utilised to ensure that foods selected for the basket would be representative of typical eating patterns in Australia. The food categories consumed by the highest percentage of individuals were chosen to make up each food sub-group in the basket (50). For example, four serves of fruit were specified by the AGHE, so the four sub-major fruit groups consumed by greatest proportion of adults aged 19 years or more in NSW were included (pome, tropical, citrus and other fruit). The method of selection of “extra” foods was different to that of the core foods. Since no single category relates to these foods, they were selected as the most commonly consumed foods from the following categories used in the NNS: cereal-based products and dishes, milk products and dishes, sugar products and dishes, confectionery, fats and oils, savoury sauces and condiments, and non-alcoholic beverages. Tea and coffee were also included.

Franklins and Woolworths in central Wollongong and Coles at Figtree provided data on product sales volume in their stores in August 2000 which were used to establish patterns of local food purchasing behaviour. This supermarket data was used to choose the specific foods for inclusion in the basket. For each sub-major food group selected from the NNS, the top selling food was chosen from the local supermarket data. For example, pome fruit was the most commonly consumed fruit variety recorded by the NNS and green apples were the best selling type of pome fruit, according to the local supermarket data. Green apples were thus included in the basket as a commonly purchased food in the Illawarra area.

Adjustment of foods selected to comply with nutritional guidelines

After the draft list of foods was developed they were checked against the National Heart Foundation’s Pick the Tick Guidelines for Acceptability (51). The purpose at this stage was to select healthier alternative foods where possible, rather than ensuring the whole diet met current nutrition guidelines. However the AGHE does allow for “extra” foods and recognises that these may contain high levels of fat, salt or sugar (34). The extra foods were

therefore not expected to comply with the National Heart Foundation guidelines.

Foods failing to comply with the NHF guidelines were changed for a similar food with less fat, salt, or sugar, or more fibre. In some cases only specific brands were compliant with the NHF guidelines, so these were specified. For example cheddar cheese was specified as Bega or Bodalla reduced fat varieties. Other examples of changes included: substituting Paradise “Lite” crispbreads instead of Saos, and specifying 97% fat free ham. An exception to this process was made in the case of bread. Most major brands of bread on the supermarket shelf at the time contained more than the NHF recommended quantity of sodium (450mg/100g), albeit by only a small amount. However, bread is a significant food within the Australian diet and most people consume one of the major branded products. It was therefore decided to allow any of the available wholemeal breads to be included.

Nutritional analysis of basket and specification of quantities to meet nutritional targets.

The final stage in the development of the basket involved several steps:

1. Constructing menu plans for each reference family member
2. Analysing the nutritional content of the menus and comparing them to targets
3. Adjusting food choices to comply with quantified dietary guidelines
4. Determining the final quantity of each food to be included in the basket.

A seven day menu plan for each family member was constructed based on a number of nutrition education resources (52-55). These menus were then analysed using the FoodWorks nutrient analysis program (56) with the AusNut food composition databases (57). Height data for the reference family members were taken from the relevant mean values reported in the NNS (58). The aim was for the menus to meet 100% of the RDIs for all nutrients for each family member, with the exception of energy, for which meeting 95% was accepted. This is the energy level that was used in defining the HFAB (44) and the NT Nutritionist’s Market Basket Survey (41). Using recommendations of the Better Health Commission (59), a daily maximum of 2300mg was set for sodium (1730mg for the five year old), and 30g/day set as the target for dietary fibre for the adults. The “Age Plus Five” recommendation was used to establish the fibre targets for the children (60).

In addition to the nutrient analysis, the menus were also assessed for compliance with the Dietary Guidelines for Australians (61). To do this, a variety of quantified targets were developed for the food-related guidelines, as set out in Table 2, using relevant authoritative government recommendations where possible (guidelines related to body weight, alcohol and breastfeeding were omitted). For the first of the guidelines on eating a variety of nutritious foods, a scoring system devised by an Australian nutrition group was used, which counts the number of different food types consumed per week out of a list of 53 possible biological sources (62, 63).

When the analyses revealed there were inadequacies in the nutritional profile of the foods selected for the draft basket, foods were deleted, substituted or added. Examples of these changes included specification of reduced salt varieties of baked beans and tuna packed in water, exclusion of full cream milk, sour cream and potato chips (in order to meet saturated fat targets), specification of Spicy Fruit Rolls instead of family assorted biscuits (because of higher levels of fibre and less salt), substitution of whole frozen chicken for BBQ chicken, and addition of more canola oil and margarine to ensure energy levels were adequate.

Lastly some further adjustments to the food choices were made to reduce the likely cost and ensure availability and acceptability, without compromising the nutritional content: frozen crumbed fish fillets were substituted for perch, canned peaches replaced mandarins, and additional sugar was included for use with tea and coffee.

The nutrient analysis of the menus was carried out using the edible portion components of the food only, assuming there was no food waste when consumed. Once the final amounts of food were established from the menu analysis, the total quantities that would be required to be purchased for the basket were calculated using estimates of edible portions contained in Australian food tables (64). For example, the quantity of avocado included in the basket to satisfy the nutritional targets was 160g. Since the estimated edible portion of an avocado is 72%, the amount specified to be purchased to calculate the IHFBI was $160/0.72 = 220\text{g}$.

Results

The final 57 foods and the quantities defined for the IHFB are given in Table 3, organized by the food groups used in the AGHE. Some of the items are branded products but most are not. There are 13 food items included that are classified as extra foods in the AGHE; making up 6.2% of the total mass of food and contributing 19% of the total energy (almost two thirds of this from the canola margarine and oil, ice-cream and chocolate).

The foods in the IHFB enable all the recommended serves from the core food groups of the AGHE for the reference family to be provided over a one week period, with a food variety score of 37 out of possible maximum of 53. Some of the biological food categories that are not represented in the basket include: shellfish, crustaceans, offal, game, peppers, rye and berries. The total energy content of the basket was 318MJ, with a macronutrient profile of 20%E protein, 28%E fat and 52%E carbohydrate. Table 4 shows that analysis of the seven day menus found that 100% of nutrient requirements could be met for each family member with the exceptions of sodium and zinc. For sodium, the maximum recommendations were exceeded for all family members - except the 65 year old female - by up to 66% (or 1522mg per day). Zinc was adequate for most family members but was slightly marginal for the 65 year old female (94%RDI). The saturated fat targets were also all met, except for the 5 year old (11.8% of energy from saturated fat).

Detailed instructions were developed for the costing of the basket, to guide surveyors about which products to choose. Further details on the costing procedure are contained in the accompanying paper (65).

Discussion

The choice of a reference family of five individuals used for this study is somewhat arbitrary. Other baskets have been based on notional reference families of four, five or six individuals, sometimes including a child in the 8-11y age group (44, 47). This makes direct comparisons between baskets difficult. Although there are the same number of foods in the IHFB as the SA basket, only 38 of the items are the same (47). Some of the significant differences are less use of canned foods in the IHFB than in the SA basket (which may have been because of the rural focus of that study, where access to fresh produce can be more difficult) and the inclusion of items such as tea, coffee, tomato paste, peanut butter, Vegemite and Milo in the IHFB.

The menu analysis shows that the IHFB is nutritionally adequate for the reference family, although it is acknowledged that the assumption of no waste is a limitation. The sodium target was exceeded despite the use of some no added salt products where possible. Sodium is present in many staple foods such as bread, breakfast cereals and cheese. It has been estimated that just six percent of men and 36% of women in Australia meet the current targets and that the mean intake for adult males is 70% above the target of 100mmol/day and 18% above for females (66). The values for the foods in the IHFB (127% of target sodium overall) are comparable to this and to the values in other food baskets: 130% in the SA basket (47) and 239% in the HFAB (44). The slightly high proportion of saturated fat for the 5 year old boy (11.8%E) provided by the basket could possibly be overcome by more judicious menu planning. The AGHE, which was used as the basis of the basket plans, acknowledges that the proportions of food specified for 5-14 year olds may provide too much saturated fat (34).

Since the development of the IHFB new editions of the dietary guidelines for Australian adults and children have been released (67, 68). The new guidelines no longer have specific recommendations about calcium and iron intake, but now support including lean meat or alternatives and reduced fat varieties of dairy products. The specifications of foods in the IHFB conform to both of these recommendations. Despite the limited number of foods in the basket it rated well on food variety with a score of 37 out of 53. It has been suggested

that a score of less than 20 can be regarded as poor and greater than 30 as very good (69). There is evidence that people whose diets have poor scores using this rating system are at greater risk of disease (62, 70).

Inevitably the final selection of foods included in the basket is still somewhat arbitrary, reflecting the individual choices of the researchers. It was decided to include some extra foods as treats (eg, cake, chocolate and soft drink), in order to construct a basket that acknowledges the place of such foods in the AGHE. Basing the food choices on NNS and supermarket data, and including the extra items, is likely to make the basket more socially acceptable than one designed solely for maximal nutritional content, but the final foods included cannot reflect the choices of all consumers. Some of the choices within the core foods were based on a desire to include a mix of basic and more exotic food choices (eg including kiwi fruit), which also adds some arbitrary component of choice. However this basket is not being suggested as a healthy diet plan for use by all Australians; if it were, there would be a need to continually review and update the basket contents to incorporate new science and recommendations. Ideally too a nutritious diet would contain a greater variety of foods than those in this basket; the number of foods was deliberately limited in this model for research convenience. Rather the IHFB is designed as a modeling tool to enable the measurement of trends in costs over time.

For our purposes here, the “healthy” basket was defined as one that met recommended nutrient requirements and was consistent with the recommendations in the AGHE and the dietary guidelines. Like other baskets it includes some limited snack foods like biscuits , cake and chocolate as extras. There are more of these extra foods in the IFHB than the Queensland HFAB, but a similar number to the SA and Tasmanian baskets (39, 47). However, the IHFB does not include any alcoholic beverages, although these typically contribute more than 10% of the energy in the Australian adult diet (67). The basket contains a preponderance of fresh products along with well known branded products that are likely to be available in the future to allow trends to be monitored over time.

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Table 1. Selected Australian food baskets

Name	Year	Authors	Purpose	Basis of food selection	Reference family	Foods
Food Price Index	Quarterly since 1960	Australian Bureau of Statistics (71)	Part of national Consumer Price Index measuring changes in prices of consumer goods	Foods selected from the Household Expenditure Survey (2)	No	Variable number in 29 expenditure classes ^(a)
Kimberley Market Basket	1985	Sullivan et al (35)	To help determine the cost to Aboriginal people in the Kimberley of basic food items	The most popular food items purchased at community stores in the Kimberley	2 adults and 3 children	39 fresh and packaged
Food Cent\$	1997	Foley et al (16)	Basis for an education tool about low cost healthy eating	Five Food Groups (72) Healthy Diet Pyramid (73)	2 adults and 2 children	53 mostly fresh or unprocessed foods
Northern Territory Nutritionist's Market Basket Survey	1997	Price et al (41, 42, 74)	To measure quality, variety and cost of healthy foods in remote Aboriginal community stores in NT	Core Food Groups (32)	3 adults and 3 children	30 fresh and packaged
Queensland Health Food Access Basket (HFAB)	1997	Leonard et al (43-46)	To measure access to healthy food across Queensland and trends over time	Core Food Groups (32) Apparent Consumption data (75) to meet 70% nutritional and 95% energy requirements	3 adults and 3 children	44 fresh and packaged
Tasmanian Food Price, Availability and Quality Survey	1997	Beaumont (39)	To investigate how price, availability and quality of food vary across Tasmania	Not stated. Wide representative selection in 29 categories. Includes 31 regular foods matched with healthier alternatives	No	122 fresh and packaged
Indicative Budget Standards for Australia	1998	Saunders et al (76)	To calculate the minimum cost of an adequate standard of living for social policy planning	NNS (50) Core Food Groups (32) RDIs (33)	No	139 including alcohol and take away
Food Supply in Rural South Australia	2000	Meedeniya et al (47)	To examine variations in cost, quality and variety of food supply across SA	Australian Guide to Healthy Eating (34)	3 adults and 3 children	57 fresh and packaged
Price Surveys	2000	Australian Competition and Consumer Commission (77)	To monitor price changes during the introduction of the new tax system	Commonly purchased goods	No	88 food subclasses – fresh and processed
Supermarket Price Survey	2003	Australian Consumers Association (78)	Comparison of grocery prices in supermarkets nationally	Convenience sample of popular brands	No	25 packaged foods only

^(a) Data on exact number of items not available. There are approximately 1000 items costed in the full CPI and food is weighted as 18% of the CPI (71)

Table 2. Quantified targets defined to assess compliance of menus with dietary guidelines ⁽⁶¹⁾

Guideline	Criteria	Targets										
Enjoy a wide variety of nutritious foods	Food variety score (62, 69)	At least 30 different biological food types per week										
Eat plenty of breads and cereals (preferably wholegrain), vegetables (including legumes) and fruits	Australian Guide to Healthy Eating (34)	Adults: 5-7 serves breads and cereals 6-8 serves vegetables and legumes 3-4 serves fruit										
Eat a diet low in fat and in particular saturated fat	NHMRC (79, 80)	<table> <tr> <td></td> <td>Adults</td> <td>Children (5-14)</td> </tr> <tr> <td>Fat</td> <td><30%E</td> <td><35%E</td> </tr> <tr> <td>Sat fat</td> <td><10%E</td> <td><10%E</td> </tr> </table>		Adults	Children (5-14)	Fat	<30%E	<35%E	Sat fat	<10%E	<10%E	
	Adults	Children (5-14)										
Fat	<30%E	<35%E										
Sat fat	<10%E	<10%E										
Eat only a moderate amount of sugars and foods containing added sugars	Better Health Commission recommendations (59)	Refined sugars no more than 12%E										
Choose low salt foods and use salt sparingly	Better Health Commission recommendations (59)	5 year old: 460-1730 mg sodium Others: 920-2300 mg sodium										
Eat foods containing calcium	Recommended Dietary Intakes (33)	<table> <tr> <td>Males</td> <td>800 mg</td> </tr> <tr> <td>Females (39y)</td> <td>800 mg</td> </tr> <tr> <td>Females (15, 65y)</td> <td>1000 mg</td> </tr> </table>	Males	800 mg	Females (39y)	800 mg	Females (15, 65y)	1000 mg				
Males	800 mg											
Females (39y)	800 mg											
Females (15, 65y)	1000 mg											
Eat foods containing iron	Recommended Dietary Intakes (33)	<table> <tr> <td>Male (5y)</td> <td>6-8 mg</td> </tr> <tr> <td>Female (15y)</td> <td>10-13 mg</td> </tr> <tr> <td>Male (39y)</td> <td>7 mg</td> </tr> <tr> <td>Female (39y)</td> <td>12-16 mg</td> </tr> <tr> <td>Female (85y)</td> <td>5-7 mg</td> </tr> </table>	Male (5y)	6-8 mg	Female (15y)	10-13 mg	Male (39y)	7 mg	Female (39y)	12-16 mg	Female (85y)	5-7 mg
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Male (39y)	7 mg											
Female (39y)	12-16 mg											
Female (85y)	5-7 mg											

Table 3. The final version of the Illawarra Healthy Food Basket

Food Item	Quantity
Breads and cereals	
Crispbread (Paradise Lites)	500 g
Crumpets	1100 g
Fruit toast	1300 g
Quick cooking oats	500 g
Sultana bran	200 g
Weetbix (or equivalent)	465 g
White hamburger buns	450g
White rice (long grain)	830 g
White spaghetti	600 g
Wholemeal bread	3.40 kg
Milk, yoghurt, cheese	
Cheddar cheese, reduced fat	610 g
Low fat vanilla yoghurt	4.4 kg
Reduced fat milk	11.75 L
Vegetables and legumes	
Avocado	220 g
Broccoli	640 g
Brown onions	1.30 kg
Carrots	1.86 kg
Lettuce	340 g
Mushrooms	900 g
Potatoes	2.50 kg
Tomatoes	3.00 kg
Zucchini	750 g
Baked beans, salt reduced	1100 g
Frozen mixed vegetables	840 g
Frozen peas	300 g
Canned tomatoes, no added salt	990 g
Canned corn kernels	350 g
Tomato paste, no added salt	130 g
Fruit	
Apples	1.10 kg
Bananas	6.20 kg
Kiwi fruit	800 g
Oranges	1.95 kg
Canned peaches	0.96 kg
Orange juice, no added sugar	5.75 L

Meat, fish, poultry, eggs, nuts	
Beef mince (extra lean)	750 g
Leg of Lamb	820 g
Light leg ham, sliced	400 g
Pork chops, forequarter	930 g
Rump steak (lean)	650 g
Frozen fish, crumbed, baked	520 g
Tinned tuna, in spring water	300 g
Whole frozen chicken	1.2 kg
Eggs	500g
Peanut Butter, no added salt	200g
Extra foods	
Cake (plain or madeira)	300 g
Canola margarine	700 g
Canola oil	350 g
Cola soft drink	1 L
Chocolate, milk	100 g
Coffee, instant	72 g
Honey	90 g
Low fat ice cream (vanilla)	500 g
Milo	100 g
Spicy fruit rolls	280 g
Tea	63 tea bags
Vegemite	150 g
White sugar	450 g

Table 4. Percent of nutrient targets ^(a) provided by the seven day menus using only foods from the Illawarra Healthy Food Basket

	5y male	15y female	39y male	39y female	65y female
Energy	96	96	97	98	95
Protein	474	232	248	225	199
Thiamin	222	219	202	225	232
Riboflavin	271	253	212	251	257
Niacin	301	301	323	330	339
Vitamin C	464	749	666	579	637
Vitamin A	388	209	246	200	177
Sodium	134*	119*	166*	120*	99
Potassium	207	217	281	211	194
Magnesium	267	159	165	147	128
Calcium	166	133	188	156	110
Phosphorus	237	159	241	189	166
Iron	176	147	274	125	251
Zinc	177	108	147	108	94*
Dietary fibre	240	132	150	113	100

(a) Target is either RDI (33) or Better Health Commission target (59)

* Fails to meet target

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