

A healthy diet consistent with Australian health recommendations is too expensive for welfare-dependent families

Abstract

Objective: Examine the cost of healthy food habits for welfare-dependent families in Australia.

Method: A seven-day meal plan was developed, based on Australian public health recommendations, for two typical welfare-dependent families: a couple-family (two adults, two children) and a one-parent family (one adult, two children). The cost of the meal plan was calculated using market brand and generic brand grocery items, and total cost compared to income.

Results: In Australia, the cost of healthy food habits uses about 40% of the disposable income of welfare-dependent families. Families earning an average income would spend only 20% of their disposable income to buy the same healthy food. Substituting generic brands for market brands reduced the weekly food cost by about 13%. This is one of few economic models to include generic brands.

Conclusion: Compared with average-income Australian families, healthy food habits are a fiscal challenge to welfare-dependent families.

Implications: These results provide a benchmark for economic and social policy analysis, and the influence disposable income has on prioritising healthy food habits.

Key words: food cost, food security, Australian Dietary Guidelines, low-income family.

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The prevalence and incidence of chronic disease is increasing in Australia.¹ The aetiology of chronic diseases like obesity, diabetes, heart disease and some cancers, includes dietary risk factors that are, to some degree, preventable.² Scientific evidence indicates diets high in fat, sugar and salt increase chronic disease risk, whereas, a diet high in fibre, vegetables and fruit protects against chronic disease.³

To reduce nutrition-related chronic disease, Australian health authorities have developed and promoted public health recommendations. The National Health and Medical Research Council has developed evidence-based Australian Dietary Guidelines for adults, children and older Australians.⁴⁻⁶ These qualitative guidelines promote a varied diet high in wholegrain cereals, fruit and vegetables.⁴ The Australian Guide to Healthy Eating is a food selection guide to assist selection of healthy food consistent with the Australian Dietary Guidelines.⁷

The 'five food groups' as described in the Australian Guide to Healthy Eating, are: fruit, vegetables, breads and cereal, dairy, lean meat and fish. The Australian Guide to Healthy Eating uses the five food groups to provide a benchmark of approximate whole-quantities of food for good health. For example, public health recommendations for an adult is: eat 'five or more serves from bread and cereal, two serves of fruit, and five serves of vegetables a day'.

Variety in food choices is needed to get adequate quantities of nutrients for physiological function. The recommended type and amount of nutrients is prescribed by the Nutrient Reference Values, and include nutrient-specific targets to reduce chronic disease risk.⁸ Consumer-targeted information on healthy eating, shopping and cooking for simple and low-cost meals is also available.^{9,10}

Despite considerable public investment, Australians are not eating foods in line with public health recommendations.¹¹⁻¹⁴ This is particularly true for welfare-dependent and low-income Australians.¹⁵⁻²⁰ Studies show low-income households in Australia are less likely to buy healthy food,¹⁹ and less likely to eat healthy food.^{15,16} Two European systematic reviews found individuals with low-income had a lower intake of fruit and vegetables, and a higher fat intake, compared with people from affluent households.^{21,22}

International studies report healthy food is more expensive than unhealthy food; diets high in fruit and vegetables cost more.²³⁻²⁸ And foods high in saturated fat, sugar and salt are cheaper.²⁹⁻³² These international results are yet to be verified in Australia. Verification is needed because countries have different pricing regulations, food taxes and influences such as manufacturing and distribution costs. However, in general, these studies support the hypothesis that cost is a barrier to healthy food habits.

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More than one-quarter of Australian households rely on welfare payments for at least half their total income.³³ Of these households, two-thirds (17% total population) rely on 90% of their income from welfare.³³ The reasons low-income families do not have healthy food habits is complex.¹¹ However, cost is a factor. Promotion of healthy food habits is unlikely to achieve the desired health outcomes for low-income families if the family cannot afford the healthy food.

We estimated how much money typical welfare-dependent Australian families need to spend to eat according to Australian public health recommendations. Welfare-dependent families were chosen for this study because they are at high risk of nutrition-related chronic disease, and are vulnerable to food insecurity.^{2,34} This paper reports on the relative affordability, as a percentage of disposable income, of a seven-day meal plan for two typical welfare-dependent Australian families.

Methods

This is an exploratory study using desk research techniques, economic modelling, and quantitative analysis. To assess the cost of healthy eating, we created two typical welfare-dependent Australian families: a couple family, and a one-parent family. We modelled a seven-day meal plan to meet the Australian Dietary Guidelines, the Australian Guide to Healthy Eating, and the Nutrient Reference Values. Meals and recipes for the seven-day meal plan were based on consumer-targeted cooking and budgeting resources.^{9,10}

We tallied the quantity of the meal plan needed to meet the nutrition requirements of each family, then calculated the retail cost of food items from this tally. Cost of the meal plan was compared with income. Methods and modelling were adapted from previous

studies³⁵⁻³⁷ to reflect Australian welfare entitlements and Australian public health recommendations.

The couple-family and one-parent family are based on the Australian Bureau of Statistics' (ABS) 2003 Family Characteristics survey and the 2006 ABS report on Population by Age and Sex.^{38,39} Anthropometric characteristics were sourced from the ABS National Health Survey, and, the Nutrient Reference Values.^{40,8} Energy and nutrient requirements for each family member were calculated using the Nutrient Reference Values and are based on the anthropometric characteristics and Physical Activity Level,⁸ presented in Table 1. For each child a Physical Activity Level representing light activity was chosen and incorporates a growth factor. For the adults, the Physical Activity Level chosen represents sedentary activity or seated work with little or no strenuous leisure activity.

Estimated energy requirements of each family member were calculated based on age, gender, weight and Physical Activity Level. The Estimated Average Requirement, or, Adequate Intake, was used to determine requirements for each macro- and micro-nutrient. The Estimated Average Requirement is the amount of nutrient estimated to meet the daily requirements of half the healthy individuals in a particular life-stage age and gender group.⁸ For sodium, the Upper Level of intake was used. The Upper Level refers to the highest average daily nutrient intake likely to pose no adverse health effects.⁸ The Acceptable Macronutrient Distribution Range, outlined in the Nutrient Reference Values, was used to calculate percentage macronutrient distribution.

The seven-day meal plan was modelled to:

- Supply the same meals (breakfast, lunch, dinner, snacks and extras) to each family member, in amounts to meet each members' individual nutrition requirements.
- Meet the Australian Dietary Guidelines for adults and children (male and female).

Table 1: Characteristics and Physical Activity Level (PAL) of the two Australian families.

Couple-family (2 adults, 2 children)						One-parent family (1 adult, 2 children)					
Age (years)	Gender	Height (m)	Weight (kg)	BMI (kg/m ²)	PAL	Age (years)	Gender	Height (m)	Weight (kg)	BMI (kg/m ²)	PAL
40	Male	1.78	87.2	27.5	1.4	40	Female	1.64	68.5	25.5	1.4
40	Female	1.64	68.5	25.5	1.4	12	Female	1.51	41.6	18.2	1.6
12	Female	1.51	41.6	18.2	1.6	7	Male	1.22	23.1	15.5	1.6
7	Male	1.22	23.1	15.5	1.6						

Table 2: Recommended daily serves from each of the five food groups as set out in the Australian Guide to Healthy Eating (AGHE), and actual average daily serves provided by the meal plan for each family member.

	7 year-old male		12 year-old female		40 year-old female		40 year-old male	
	Rec. daily serve AGHE	Av. daily serve Meal Plan	Rec. daily serve AGHE	Av. daily serve Meal Plan	Rec. daily serve AGHE	Av. daily serve Meal Plan	Rec. daily serve AGHE	Av. daily serve Meal Plan
Bread, cereal, rice, pasta, noodles	3-4	3.5	4-7	4	4-6	4	5-7	5
Vegetables, legumes	4	4.5	5-9	5	4-7	5	6-8	6
Fruit	2	2	3-4	3	2-3	2.5	3-4	3
Milk, yoghurt, cheese	3	3	3-5	3	2-3	2.5	2-4	2.5
Meat, fish, poultry, eggs, nuts, legumes	0.5-1	1.5	1-2	1.5	1-1.5	1.5	1.5-2	2
Extra foods	1-2	1.5	1-3	1.5	0-2.5	1.5	0-3	2

- Provide 95 to 100% of estimated energy requirements for each family member.
- Provide 100% of Estimated Average Requirement, or Adequate Intake, for each macro and micronutrient.
- Balance and vary the food from each of the five food groups as outlined in the Australian Guide to Healthy Eating,⁷ Model B (Table 2).
- Be simple, low cost, and was palatable to all family members (as guided by consumer-targeted resources).^{9,10,41}
- Exclude alcohol and take-away food because these are not consistent with healthy eating, or low-cost eating.

To verify energy and nutrient targets were achieved, the nutritional profile of the meal plan was analysed using FoodWorks Professional Edition (Version 4.0, Xyris Software) nutrient analysis program.⁴³ Table 3 presents the nutrient analysis. Calculations were made using raw weights and edible portions of foods. The meal plans met 100% of requirements for all nutrients for each family member (Table 3), with the exception of energy, for which 95% was accepted, consistent with other methods.^{36,42} Sodium exceeded the upper level for all family members, except the 40 year-old female (Table 3).

The cost of each food item was sourced from two major supermarket chains in June 2007. For each supermarket chain, prices were sourced online, and at a single retail outlet in metropolitan Melbourne, selected by convenience. An average of the four prices was used to calculate the cost of the meal plan. We included online prices on an assumption these prices may better reflect an 'average' of Australian grocery pricing across socio-economic status within a metropolitan area. The difference in price between online and in-store prices was unremarkable (data not shown).

Table 3: Percentage (%) of estimated energy requirements and macro and micro-nutrients requirements (Estimated Average Requirement) provided by the meal plan for each reference person.

	7-year-old male	12-year-old female	40-year-old female	40-year-old male
Energy	98	96	96	95
Protein	488	365	210	170
Dietary Fibre ^a	128	150	111	141
Vitamin A	313	290	234	228
Thiamin	260	224	159	186
Riboflavin	444	318	250	235
Niacin	529	405	310	335
Folate	223	165	120	150
Vitamin C	764	719	658	767
Calcium	245	132	145	158
Iron	258	204	145	238
Magnesium	273	174	122	111
Phosphorus	414	177	295	336
Potassium ^a	136	146	122	105
Sodium ^b	127 ^c	103 ^c	84	112 ^c
Zinc	350	234	169	106

Notes: a) Percentage Adequate Intake

b) Percentage of Upper Level of intake

c) Exceeds Upper Level

We calculated the cost of the meal plan using market brand products and compared this cost when generic brands were substituted where possible. The price of the lowest-cost market brand was used in the calculations, and price of generic products was included if the generic-brand product adequately represented the item used in the meal plan. For example, generic brands needed to be low fat, low salt, high in fibre or low in sugar. Where a 'healthy option' generic brand was not available, the generic brand was not included in the calculation. This means the cost analysis for 'generic brands', is a mix of generic and market brand prices.

The price of the 'standard' (or medium) packaging size for each product was recorded for the cost calculations for brand and generic products. We avoided selection of bulk or small packaging to minimise the impact of package size on the cost of the meal plan. The cost of each item in the meal plan was calculated also in terms of the package size, for example, \$/mL or \$/gram, to account for small variations in pack size between brand and generic products.

Each food item in the meal plan was tallied to determine total quantity needed for each recipe or meal/snack. The cost of the meal plan included the cost of complete ingredients of a recipe and actual amounts required. For example, garlic and seasonings were included in cost calculations, and not just the 'core foods' of a recipe. If only half a tin of fruit was needed, cost calculations were based on half a tin and not the whole tin. The purchase price was adjusted to account for edible portions, as sourced from Australian food tables.⁴⁴ Complete ingredients for the meal plan were grouped according to each of the five food groups and the total cost of each food group tallied for each family.

To calculate relative affordability, total cost of the seven-day meal plan was expressed as a fraction of weekly disposable income for each family; the weekly disposable income is the family's total income, taken as the income each family has available for food and all other expenses.

For a welfare-dependent family, with no family member in paid employment, 'disposable income' is the total welfare benefit. Welfare entitlement in dollar amount was sourced from Centrelink online in June 2007.⁴⁵ For an average-income family, 'disposable income' was defined as total salary income plus any welfare benefits, less tax. Average disposable income for 2007 was determined using the 2005 ABS report on household income for wage earners³³ adjusted for inflation.⁴⁶ Estimates for welfare dependent and average wage earning families do not include any one-off payments such as school allowance or rent assistance.

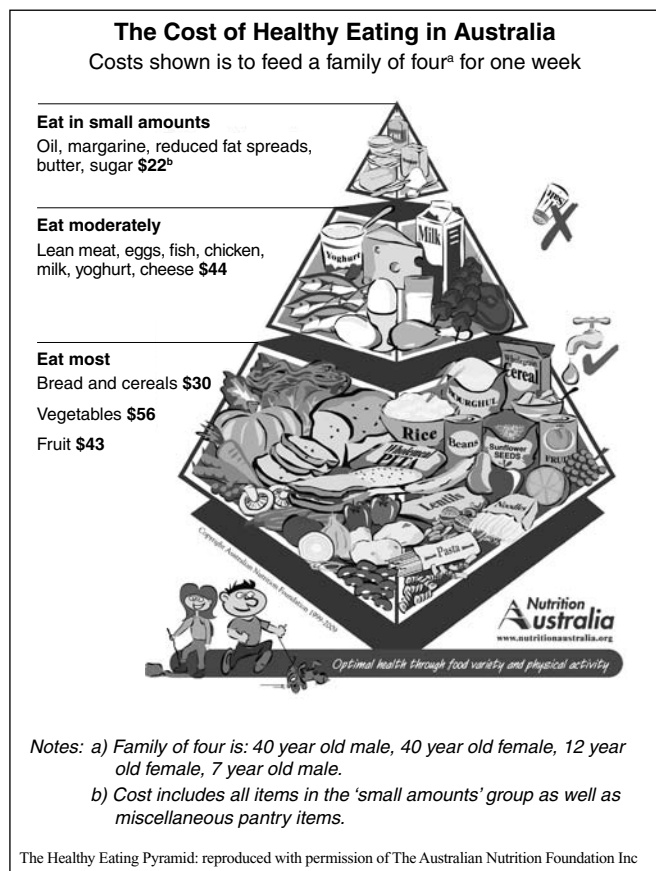
Results

The seven-day meal plan met the recommended number of serves from each food outlined by the Australian Guide to Healthy Eating (Table 2). The meal plan provides on average 20% protein, 23% fat (8% saturated fat), and 57% carbohydrate, consistent with Acceptable Macronutrient Distribution Range, as detailed in the Nutrient Reference Values. For each reference family member, the meal plan provided at least 95% of estimated energy

requirements and exceeds the Estimated Average Requirement for each micronutrient (Table 3).

Table 4 shows the total cost of the meal plan for the couple-family is \$239 for market brands. When generic brands were included, the cost was \$207, a cost-saving of around \$32 a week. The cost of purchasing the meal plan for the one-parent family was \$173 for market brands and \$150 with generic brands, a cost saving of around \$23 a week.

Figure 1: The cost of healthy eating in Australia: Prices shown are weekly food cost for a typical Australian couple-family (two adults, two children) for each of the food groups depicted in The Healthy Eating Pyramid. Total weekly food cost is \$239; \$60 per person per week, and ~\$8 per person per day.



When food items were grouped and costed according to the five food groups, vegetables cost the most of all the food groups, and, as a percentage of income (Table 4). The cost of fruit and vegetables was almost one half (44%) the total cost of food, which reflects the public health recommendation, 'eat most' of fruit and vegetables (Figure 1) as modelled in our meal plan.

The total cost of the meal plan was reduced by 13% when generic brands were included. Selection of generic brands considerably reduced the cost of dairy products, cereals, bread, extra foods, and pantry items (cost-saving between 22 to 28%). Cost savings for generic branded meat, fruit and vegetables, was 5 to 7%, reflecting these items, in general, are not 'packaged' and therefore not available in a generic brand.

Disposable income for the welfare-dependent couple-family is \$544 a week, and for the one-parent family, \$446 a week. Disposable income for the average-income couple-family is \$1,323 a week, and for the one-parent family \$682 a week. The average-income couple family has an income almost two-and-a-half times that of the comparative welfare-dependent family. The average-income one-parent family has an income one-and-a-half times that of the comparative welfare-dependent family.

The cost of the meal plan for the couple and one-parent family for market and generic brands is shown in Figure 2. The welfare-dependent couple-family would spend nearly half, 44% (38% with generic brands), of their total weekly income to buy the meal plan. A comparable average-wage couple-family would spend 18% (16% with generic brands) to buy the same meal plan. A welfare dependent one-parent family would spend 39% (34% with generic brands) of their total weekly income to buy the meal plan. A comparable average-wage one-parent family would spend 25% (22% with generic brands) to buy the same meal plan.

Discussion

To investigate the economics of healthy food habits, we developed a seven-day meal plan for two typical Australian families, as an alternative model to the 'market basket', and assessed the fiscal implications of public health recommendations (the Australian Dietary Guidelines). The modelled meal plan represents 'lifestyle modification' counselling in line with the

Table 4: Cost comparison of market and generic brands. Reduction in cost difference (%) when market brands are substituted for generic brands. Presented as 'five food groups'; in order of highest cost food group to lowest cost.

Food Group	Couple family			One-parent family		
	Market	Generic	Reduction	Market	Generic	Reduction
Vegetables	\$56.04	\$52.60	6%	\$39.79	\$37.09	7%
Fruits	\$43.64	\$40.65	7%	\$31.40	\$29.17	7%
Meat, fish, chicken & eggs	\$44.19	\$41.82	5%	\$31.63	\$30.00	5%
Dairy products	\$43.35	\$33.81	22%	\$34.40	\$26.92	22%
Cereals & breads	\$29.99	\$22.66	24%	\$20.56	\$15.82	23%
Extra foods & pantry items	\$21.86	\$15.78	28%	\$15.72	\$11.50	27%
Total cost per week	\$239.07	\$207.31	13%	\$173.50	\$150.50	13%
Cost per person per week	\$59.77	\$51.83		\$57.83	\$50.17	
Cost per person per day	\$8.54	\$7.40		\$8.26	\$7.17	

Notes: The cost calculations of the generic brand is a mix of generic and market brands.

Australian Dietary Guidelines, likely to be recommended by a dietitian, but tailored to be simple and low budget to meet the needs of welfare-dependent clientele.

Our results show welfare-dependent families need to allocate at least one-third of their weekly income to food to eat according to public health recommendations. An Australian opinion paper published 18 years ago reported one-quarter (20-25%) of disposable income spent on food is an acceptable allocation of the budget for low-income families.⁴⁷ That opinion paper is the only available Australian benchmark for healthy eating as a proportion of income. Our figures suggest welfare-dependent families in Australia today will find it increasingly difficult to afford healthy food habits, having to allocate almost double the 'acceptable allocation' (40% versus 25%) of their income.

Studies in other countries show similar findings in the financial capacity of welfare-dependent groups to prioritise buying healthy food. A study in Ireland calculated two adults with two children would have to spend close to 70% of weekly household income to purchase a food basket based on Irish dietary recommendations.³⁵ This figure was even higher for a single parent with one child, needing to spend 80% of income on food.³⁵ A Canadian study found people earning a minimum wage did not have adequate income to meet basic needs, including a nutritious diet.⁴⁸ The Canadian study reported a family of four would have to spend 35%, and a single-parent family 27%, of income on food.⁴⁸ The difference between the Irish and Canadian studies is the Irish study assessed cost against welfare entitlements as their sole income source, whereas the Canadian study compared cost against minimum wage. Our study result is comparable to the Canadian study when generic brands are included; the proportion of weekly income to buy healthy food for a couple-family in Australia at 38% (Canada 35%), and a one-parent family 34% (Canada 27%).

Australia is yet to adopt a national approach to monitor the cost of food in line with public health recommendations. In the absence of a national tool, independent research groups developed

'market basket' surveys to monitor the cost, quality and availability of healthy food.^{36,37,49-54} A 'market basket' is a list of food items (type and quantity) sufficient for a family (or individual) for a defined time period. The definition of a 'market basket' varies between surveys for the number of people and time period, and is based on the characteristics of the population living in the area under investigation.

The Adelaide market basket survey, which assessed five sites with a range of socio-economic status, indicated food availability (access) may not be a barrier to choosing healthy food.⁵³ Healthy food items were available in stores at all sites. This study in Adelaide showed the price of food in supermarkets 'followed' socio-economic status; higher prices in areas of higher socio-economic status, lower prices in areas of lower socio-economic status. In contrast, our study assumes healthy food is available at all times in all stores, and investigates cost only. This is intentional, as our study sought to address potential inadequacies in current public health recommendations and not the inadequacies of food availability and in-store pricing.

Our study shows the selection of generic brands over market brands can improve affordability. Previous Australian surveys have not included generic brand items because generic brands are not always available in areas surveyed. When it comes to healthy food habits, a 'healthy' option in a generic brand is not always available. Where a 'healthy' generic brand item is available, it may have a reduced nutrient quality. A New Zealand study showed generic foods had higher sodium levels.³⁰ Therefore, if a family relied solely on generic brands to reduce total food costs, the healthiness of the meal plan could be compromised.

Low-income households could use strategies to reduce food spending such as buying a higher number of discounted products, or take advantage of volume discounts by purchasing larger (bulk) package sizes. However, a US study found low-income households had the lowest proportion of 'bulk' purchases, indicating these families may not be able to partake in bulk and discount buying.⁵⁵

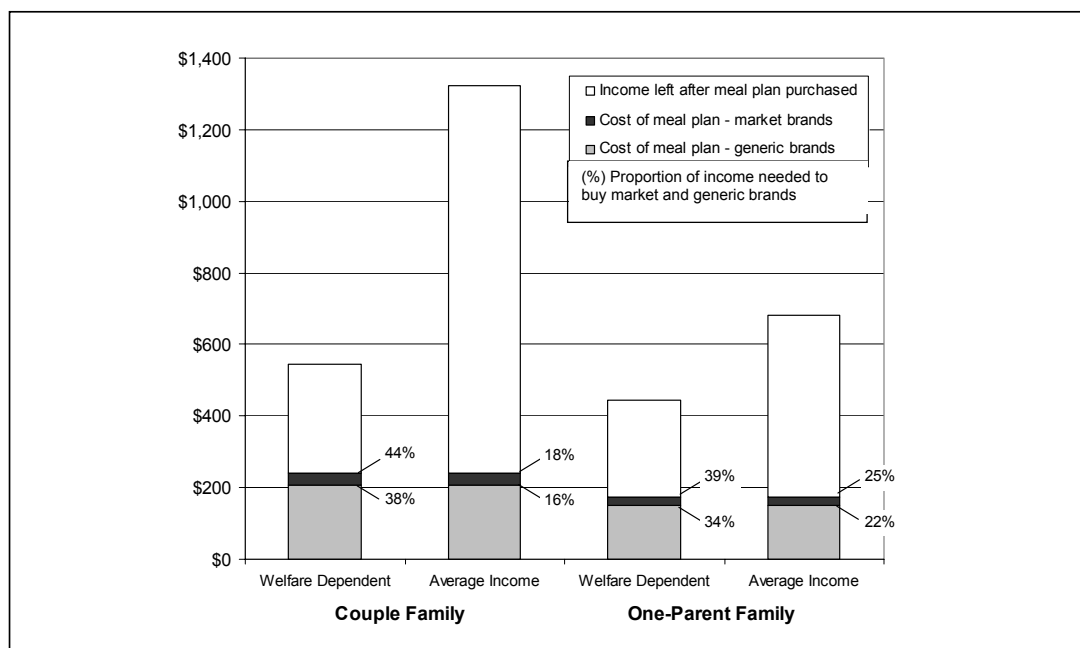


Figure 2: The cost of the meal plan with generic brands, market brands, and the amount of income left after the meal plan is purchased, for welfare-dependent and average income couple and one-parent family.

An Australian study found 40% of low-income households have no car and have limited storage facilities for food.^{56,57} Based on our modelled income for a welfare-dependent family, we expect families would not have sufficient cash to 'bulk' purchase or buy ahead. Thus, the cost of the meal plan used in our study did not include any cost-saving strategies. We expect cost-saving strategies are easier for higher-income families, and may widen the 'affordability gap' for healthy food for welfare dependent families.

Our meal plan costs about \$8 per person per day, similar to a recent Australian market basket survey reporting \$7 per person per day to buy their healthy basket.⁵⁸ The cost of \$8 per person per day might be interpreted as 'affordable'. However, in our modelling, we did not include non-food expenses such as cleaning and hygiene products in the weekly shopping tally. Other non-food expenses such as rent (or mortgage), utility bills, school costs, medical costs, and car running costs, as well as discretionary spending on alcohol and cigarettes, recreation, clothing, and holidays, were also not included in the analysis. Non-food expenses often take priority because they are less flexible compared with the food budget. Because of this, we expect Australian welfare dependent families would struggle to consistently allocate the required 30 to 40% of their budget to healthy food to achieve and maintain good health.

We suggest research continue to explore discretionary and non-discretionary expenses to identify the actual budget available to welfare-dependent Australian families, and to determine actual money spent on food. Then, compare this to the cost of our seven-day meal plan to 'cost' the gap. There is the capacity in our meal plan to replace certain meals with take-away meals to more closely represent food behaviours of typical Australian families.

We suggest Australia adopt Canadian methods to monitor food expenditure by recording exactly the type and quantity of food and beverages purchased and the price paid.⁵⁹ When food and purchasing data is available, economic modelling can be more accurate and could then include the time-cost of buying, preparing, and serving a healthy diet, that includes plate waste, and waste from spoiled fresh foods. A comparison with what Australians currently eat, and the difference in cost when these choices are substituted for healthy choices would also be of interest.

The cost of healthy food is not the sole contributor to nutrition-related health problems in Australia. It is recognised Australia needs to reassess public policy, and particularly the relationship between policy and business in supporting healthy food habits to reduce nutrition-related health problems.⁶⁰⁻⁶² However, efforts to publicly promote healthy food habits will only benefit all Australians if all Australians can afford healthy food.

Our study suggests welfare dependent families (almost 20% of the population) could not afford healthy food habits. To improve the health of Australians in the long term, we recommend food and nutrition monitoring programs are established to better understand the economic barriers to healthy food habits in Australia. This includes confirming the 'affordability gap' for healthy eating and to identify strategies to reduce this in the future.

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