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The price of healthy eating: cost and nutrient value of selected regular and healthier supermarket foods in New Zealand

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Abstract

Aim To estimate the difference in cost and nutrient value for selected regular and healthier supermarket food items in New Zealand.

Method Electronic sales data from supermarket shoppers (n=882) from February 2004 to January 2005 were used to determine the 1000 top-selling food items. These items were categorised according to food type. Five regular items and five healthier options were selected per category to create two shopping baskets for which cost and nutrient data were then compared.

Results The total weekly household cost did not differ substantially overall: NZ$90.21 for the regular basket vs NZ$96.63 for the healthy basket. However, healthier options were more expensive for some specific food categories: meat and poultry (27%); butter and margarine (44%); and cheese (19%). Healthier options were less expensive for canned fish (10%). Per unit weight, the healthier basket contained considerably less energy (29%), total fat (35%), saturated fat (52%), sugar (56%), and sodium (20%) than the regular basket.

Conclusions Cost is frequently perceived to be a barrier to a healthy diet, yet our analyses demonstrate that substantial improvements in nutrition are possible without incurring an increase in price for many staple food categories. However, healthier options within some important food categories, notably meat and spreads, are more expensive. Consideration should be given to ways in which this cost differential can be addressed to favour key healthy diet choices.

Nutrition-related risk factors such as low fruit and vegetable intake, obesity, high blood cholesterol levels, and high blood pressure increase risk of many chronic diseases including diabetes mellitus and cardiovascular disease.[1,2] In New Zealand, approximately 11,000 (40%) deaths per year are attributable to the joint effects of nutrition-related risk factors.[3] Nevertheless, these factors are modifiable and (if targeted) could reduce nutrition-related mortality and morbidity.[4]

Barriers to healthy eating are many and include social, environmental, and behavioural factors.[5] United States[6] (US) and European[7] research has shown that factors such as cost and taste are of more relevance to people when making food choices than healthy eating and weight control.

Between a quarter and a third of New Zealanders cite cost as the major barrier associated with eating more fruit and vegetables,[8,9] and a Canadian survey found that 61% of shoppers disagreed with the statement "healthier food options cost the same as regular ones."[10] However, few studies to date have directly compared the relative

costs of healthy and less healthy diets and those that have produced conflicting findings.[11–13]

Our objective was to use New Zealand electronic supermarket sales data for selected commonly purchased regular and healthier food items to estimate the difference in cost and nutrient value across food categories.

Methods

Electronic sales data on supermarket food purchases were obtained during the Supermarket Healthy Options Project (SHOP) pilot study: a feasibility study of strategies to promote healthier food purchases in supermarkets. Study methods and findings have been reported elsewhere[14] but, in brief, the SHOP pilot evaluated the viability of conducting a large randomised controlled trial to evaluate the effects of price discounts and culturally appropriate nutrition education on supermarket food purchases.

One of the main aims of the feasibility study was to evaluate electronic supermarket sales data as a means to measure the effects of interventions on food purchases. The electronic data collection system was available in Pak 'N Save supermarkets in the Wellington region and consisted of handheld barcode scanners enabling registered customers to scan each item they selected from the supermarket shelf prior to purchase.

The sales data used in our analyses comprised electronic shopping data for 882 supermarket customers (registered users of the self-scanning system) collected over 12 months from February 2004 to January 2005. There were no personal identifiers associated with the data and customers were identified only by a unique number. Seventy-three percent of shoppers were female and mean (SD) age overall was 37 (11) years.

From this database, 1000 top-selling (by sales volume) food items (excluding alcoholic beverages) were extracted, which accounted for 59% of all sales transactions. Nutrient lines were matched to each food item using information from the mandatory nutrition information panel (NIP) on food packaging or national food composition data[15] for generic food items such as fresh fruit and vegetables. Nutrients included were energy, protein, total fat, saturated fat, carbohydrate, sugars, and sodium. Fibre was not included because it is not mandatory to list it on the NIP.

Since sales of these items spanned a full year, the recorded prices showed variance due to price promotions, seasonality effects, and other price fluctuations. Therefore an average price per food item was calculated over the 1-year period so as to give an accurate estimate of price over time rather than a single snapshot.

The items were categorised into food groups based on those used in the New Zealand Adult National Nutrition Survey[8] and covered a range of staple food types including bread, milk, breakfast cereals, and meat. However, not all food categories were included in our analysis. For example, categories such as "grains and pasta" were not included as there were no healthier alternatives (e.g. wholegrain rice, wholemeal pasta) available within our database of 1000 top-selling items.

Other categories such as "fresh fruit" and "eggs" were not included since they are generally healthy foods and a comparable regular substitute food could not be easily determined. Conversely, "biscuits", "cakes", "puddings", "pies", and "sugar/sweets" are generally unhealthy foods and as comparable healthier simple substitute food could not be easily determined these foods were also excluded.

A representative sample of foods for each category was chosen by a Dietitian (CNM). Five regular foods per category were selected from the database to create an average shopping basket. Efforts were made to include a wide range of brands as well as different food types within each food category.

The New Zealand Food and Nutrition Guidelines recommend wholegrain breads and cereals; reduced or low-fat milk or milk products; and lean meat, poultry, or seafood.[16] Foods, drinks, and snacks low in saturated fat, salt, and sugar are also recommended.

In keeping with these guidelines, five healthier alternatives were chosen and compiled into a healthier alternative shopping basket for comparison. The healthier food items were chosen based on a principle of simple substitution—i.e. as far as possible the healthier food item chosen was essentially the same type of food in terms of use and preparation. Our approach to identifying regular and healthier food items has been used in other published studies.[17]

Price data spanning 1 year was used to determine an average price over time for each food item. Weights for each food item were obtained either from the product description or, where this was not

possible, by visiting the supermarket to check the weight recorded on the product packaging. Use of product weights combined with average price provided a cost per 100 grams of food weight. In this way, food items that differed by weight could be standardised and a more valid cost and nutrient comparison made.

Cost per 100 grams for a food category was derived from the mean cost of items within that category. Finally, to estimate the average weekly household cost for the food baskets, these data were combined with national data on weekly estimated amounts of food required for a healthy individual.[18]

Results

Our two shopping baskets contained a total of 88 food items across 9 food categories: meat and poultry; bread; breakfast cereal; butter and margarine; cheese; canned fish; canned fruit; milk; and soft drinks (Table 1).

Table 1. Composition of regular and healthier shopping baskets

Food Category	Regular Basket	Healthier Basket
Meat and poultry	Corned Silverside Beef Mince Hellers Middle Bacon Chicken Drumsticks Beef Flavoured Sausages	Beef Casserole Steak Topside Mince Shoulder Bacon Chicken Breasts Precooked Sausages
Bread	Budget Bread Pam's White Sandwich Nature's Fresh White Toast Tip Top Wheaten Toast Tip Top Toast White	Budget Bread Multigrain Pam's Wholemeal Sandwich Slice Nature's Fresh Wheatmeal Sandwich Sandwich Wholemeal Tip Top Multigrain Toast
Breakfast cereal	Sanitarium Skippy Cornflakes Sanitarium Ricies Budget Cocoa Puffs Kellogg's Nutrigrain Hubbards Fruitful Breakfast	Hubbards Fruitful Lite Sanitarium Weetbix Kellogg's Sultana Bran
Butter and margarine	Budget Table Spread Dairymaid Butter Anchor Butter Mainland Butter Country Soft Blend	Gold N Canola Lite Olivani Light Meadowlea Lite Spread Olivio Bertrolli Light Flora Spread Light
Cheese	Chesdale Singles Tasty 12s Mainland Tasty Slice Mainland Tasty Cheese Valumetric Mild Dairymaid Tasty Cheese	Anchor Edam Cheese Mainland Edam Country Goodness Light Cream Cheese Bouton D'Or Mini Brie Chesdale Singles Smoked
Canned fish	Chef's Choice Tuna Oil Sealord Tuna Sweet Chilli Sealord Tuna Chunks in Oil Pam's Canned Pink Salmon Sealord Tuna with Tomato and Basil	Chef's Choice Tuna in Spring Water Sealord Tuna in Brine Sealord Tuna in Spring Water Chef's Choice Tuna in Brine Pam's Tuna Chunks
Canned fruit	Budget Pineapple Pieces Budget Pear Halves Oak Apricot Halves in Syrup SPC Peaches in Syrup Wattie's Fruit Salad in Syrup	Budget Peach Slices (Light) SPC Fruit Salad in Juice Wattie's Peaches in Clear Juice SPC Peaches in Natural Juice Wattie's Fruit Salad in Clear Juice

Milk (dairy and soy)	Sanitarium So Good Regular Meadow Fresh Milk Farmhouse Vitasoy Creamy Original Pam's 2 Litre Homogenised Meadow Fresh Milk Homogenised	Sanitarium So Good Lite Meadow Fresh Milk Balance Vitasoy 1L Calplus Low Fat Pam's 2 Litre Ultra Milk Meadow Fresh Milk Balance
Soft drinks	Sprite Lift Coca Cola Schweppes Tonic Vitafresh Navel Orange	Sprite Zero Diet Lift Diet Coke Schweppes Diet Tonic Vitafresh Low Cal Navel Orange

It was not possible to include five breakfast cereals in the healthier basket since there were not enough healthier options available in our database (i.e. within top-selling 1000 foods). Therefore, the number of breakfast cereals for the healthier basket was limited to three and the average cost reported was the mean for three cereals.

Comparison of total weekly household costs showed there was only a marginal price difference between the regular and healthy food baskets ($90.21 vs $96.63), although the price differential (7%) marginally favoured the regular basket (Table 2). Certain categories of food such as bread, breakfast cereals, milk, canned fruit, and soft drinks (i.e. flavoured carbonated drinks) showed little or no difference in cost, but other food categories showed more substantial cost differences (Table 2).

Table 2. Difference in weekly household cost for regular and healthier baskets*

Food category	Regular basket	Healthier basket	% higher price for healthier basket compared with regular basket
	Weekly cost (NZ$)		
Butter and margarine	2.34	3.38	44
Meat and poultry	19.38	24.57	27
Cheese	5.91	7.02	19
Soft drinks	2.94	3.15	7
Canned fruit	9.72	10.08	4
Milk	25.00	25.00	0
Bread	10.12	9.66	-5
Breakfast cereal	10.70	10.08	-6
Canned fish	4.10	3.70	-10
Total	**90.21**	**96.63**	**7**

* Food quantities based upon weekly estimated amounts of food required for a household comprised of one adult male, one adult female, one 10-year old child, and one 5-year old child. These are based on the New Zealand Food and Nutrition Guidelines and will meet the nutritional needs of most healthy people. While the food categories are the same for men, women, and children, the amounts are appropriate for each age and sex group.[18]

The healthier options were more expensive for meat and poultry (27%), butter and margarine (44%), and cheese (19%). However, healthier options were cheaper for canned fish (10%).

Comparison of nutrient values showed that, compared with the regular food basket, the healthy food basket contained substantially less energy (29%), total fat (35%), saturated fat (52%), sugar (56%), and sodium (20%) than the regular basket (Table 3).

Table 3. Differences in key nutrients* between regular and healthier baskets

Per 100g food	Regular basket	Healthier basket	Difference (%)
Sugars (g)	8.8	3.9	-56
Saturated fat (g)	9.1	4.3	-52
Total fat (g)	17.3	11.2	-35
Carbohydrate (g)	21.2	14.4	-32
Energy (kJ)	1103	784	-29
Sodium (mg)	405	324	-20
Protein (g)	9.4	10.2	8

*Listed nutrients are those required on the mandatory Nutrition Information Panel (NIP) for foods sold in New Zealand.

Discussion

Our analyses demonstrated that there was no major difference in overall cost between commonly purchased regular and healthier supermarket food items—although healthier food options within certain categories of food tended to be more expensive, namely meats, spreads, and cheese. However, fish canned in water or brine was cheaper than fish canned in oil. Despite modest differences in cost, the healthier food basket offered considerable nutritional advantages being lower in energy, total and saturated fat, sugar, and sodium contents.

These analyses were based on actual supermarket sales data from almost 900 customers over a 12-month period. As such, they have the advantage of reflecting what foods people buy most frequently from supermarkets. In addition, the fact that the sales data covered an entire year allowed us to take account of price promotions and seasonal variations in price in estimating food costs, rather than taking a single snapshot of price.

However, limitations include the fact that the sales data were obtained from a single supermarket in the Wellington region and were based on food purchases made by customers who were registered to use the handheld barcode scanner system. As such the shopping data may not reflect supermarket food purchases at a population level. Our analyses were also based on sales data for the 1000 top-selling supermarket food items and thus did not include food items that were bought in lesser volumes. However, the 1000 top-selling food items covered 59% of all sales transactions and food items with lower sales are likely to have a lesser impact overall on population diet.

Finally, we compared the cost of food items across a limited number of food categories. This was due to several reasons, including a lack of healthier food options within our product sales database for some potential food categories such as grains and pasta, and the inability to offer appropriate simple substitutes for some food items. As such, our analyses do not reflect the costs of a total diet but rather those of a selection of key food categories within the overall diet.

Some of the healthier basket items might also still be considered suboptimal in terms of an ideal “healthy” diet. For example, some of the healthier basket cheeses were still relatively high in total and saturated fat, and sugar-free carbonated soft drinks are generally not considered as healthy as plain reduced-fat milk or water.

Our findings suggest that a healthier diet is not necessarily a more expensive diet, which is contrary to popular opinion. Both Canadian[10] and New Zealand[8,9] surveys show that a substantial proportion of consumers perceive a healthy diet to be more expensive, particularly in relation to fruit and vegetables.

Some previous studies have found no difference in food costs when comparing healthy and regular diets. For example, one US study assessed dietary costs for families with children advised to follow a 20-week behaviour modification programme emphasising increasing diet nutrient density.[19] Twenty-four-hour dietary recalls suggested that daily dietary costs were less at 1 year compared with baseline, although the self-reported nature of these data means that underreporting is a possibility.

In contrast, the perception that a healthy diet is more expensive has been supported by studies such as the UK women's cohort study, which analysed food frequency intake data from over 15,000 women. The study estimated that the difference in cost between extreme ends of the healthy diet spectrum was £540 per year, with fruit and vegetable expenditure being the main contributors to the expense of a healthy diet.[11]

A United States study performed a direct comparison between the government-endorsed Thrifty Food Plan shopping basket and a healthier alternative, and found a US$36/fortnight (i.e. US$936/year) premium on the healthier basket, mainly due to higher costs of lean meats and whole grains.[13]

Extrapolation from our weekly cost data to an annual cost suggests that a healthier diet in New Zealand for the food categories we examined would cost approximately NZ$334/year more than a regular diet. This cost difference is less than that seen in the US and UK studies, although this is probably due to the fewer food categories included in our analyses. In particular, the fact that fresh fruit and vegetables were not included means that the cost differential for an overall diet is likely to be underestimated.

New Zealand household expenditure data show that vegetables and fruit comprise approximately 14% of total food expenditure,[20] which is comparable to expenditure on meat and poultry (14%), but it is considerably greater than proportional expenditure on other food categories included in our analyses including bread (4%), breakfast cereals (1%), and soft drinks (2%).

In New Zealand, 17% of deaths annually have been attributed to high blood cholesterol levels.[21] Dairy products and meat are the major sources of fat in the New Zealand diet,[8] and our per capita consumption of butter far exceeds consumption in comparable counties such as Australia, UK, and USA.[22]

Our analysis shows that healthier options within the "butter and margarine", "meat and poultry", and "cheese" categories are substantially more expensive than regular options, findings that support those of a previous New Zealand study that found foods with high saturated fat content were approximately 35% cheaper than their low saturated fat equivalents.[23]

Energy-dense (MJ/kg) diets, such as those high in fat, cost less than their energy-dilute counterparts,[24] and it has been suggested that the association between poverty and obesity may be mediated by the low cost of such energy-dense foods.[25] Our findings taken in conjunction with the well-known ethnic and socioeconomic

disparities in rates of cardiovascular disease in New Zealand,[26,27] suggest an urgent need to consider the affordability of food options low in saturated fat and energy.

In many of the food categories included in these analyses, the price of healthier foods was shown to be broadly similar to the cost of regular food items. Therefore, information on healthy eating should emphasise that it is possible to make healthier food choices for many staple food items (e.g. bread, milk, breakfast cereals) without incurring an increase in household grocery costs. However, healthier options for some key food categories are more expensive and thus consideration should be given to policies by which this price differential could be minimised, particularly for low-income shoppers who are at greater risk of nutrition-related disease and are most likely to make food choices based solely on cost rather than health.

Fiscal policy options include:

- Taxes on foods high in energy, sugar, or saturated fat;
- Exemption from goods and service tax (GST) for healthier food options; or
- A food voucher system targeted to high-risk groups.

Finally, the lack of price differential between regular and healthier food items for many food categories offers an opportunity for the food industry to use relatively small price promotions to decrease the comparative cost of the healthier food items and thus increase their sales.

Conclusions

We found that simple substitution of commonly purchased supermarket food items can improve the nutrient profile of a shopping basket substantially without impacting adversely on overall cost. The implications of this finding are two-fold: firstly, the commonly held perception that a healthy diet is an expensive diet is not necessarily true, particularly for certain categories of food; and secondly, it is possible that relatively minor adjustments to the cost of healthier food items could increase their sales relative to less healthy items.

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