

Take five: the cost of meeting the fruit and vegetable recommendations in New Zealand

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Abstract

Research indicated that many New Zealanders do not consume the daily intake of fruit and vegetables and the most common perceived barriers were cost and the rapid spoilage of fruit and vegetables. This study examined the costs of fresh and processed fruit and vegetables over a one year period to reflect seasonal variation from five selected food stores. The results indicated that the consumers can meet the 5-A-Day initiative daily for NZ\$1.13 (the cost of a typical chocolate bar) to NZ\$2.12 (the cost of a typical packet of biscuits) throughout the year. The cost of a 5-A-Day diet can be further reduced with the inclusion of selected items of processed fruit and vegetables into the daily intake. These findings are relevant to future research as low intake of fruit and vegetables is more complex than simply a factor of cost.

Introduction

A substantial body of evidence documenting that consumption of fruit and vegetables is protective against cardiovascular diseases (Hu & Willett, 2002; Van Duyn and Pivonka, 2000) and cancer (Peto, 2001; Riboli and Norat, 2003) has led to health promotion and education programmes worldwide aimed at increasing consumption to at least five portions per day. Previous studies have identified several factors associated with fruit and vegetable consumption and barriers to complying with nutritional guidelines. First, socio-economic groups differ in their fruit and vegetable intake. Low income groups have a tendency to consume less fruit and vegetables (Kirkpatrick and Tarasuk, 2003) and experience greater morbidity and mortality from chronic disease compared to higher socio-economic groups (De Irala-Estevez *et al*, 2000; Giskes *et al*, 2002), hence contributing to the widening inequalities in nutrition and health. Secondly, the perceived high costs of fruit and vegetables is a presumed barrier to intake, especially when purchased fresh (Drewnowski and Barratt-Fornell, 2004; John and Ziebland, 2004; Pollard, Kirk, and Cade, 2002; Ricciuto, Tarasuk and Yatchew, 2006).

The debate over the cost of a healthy diet is controversial, especially the issues relating to socio-economic groups' intake of fruit and vegetables, such as perception of cost, access, and availability (Cummins and Macintyre, 2006; Disdall *et al*, 2003; Ellaway and Macintyre, 2000; Kamphuis, Giskes, de Bruijin, Wendel-Vos, Brug, and van Lenthe, 2006). Studies have found that higher fruit and vegetables consumption was associated with higher diet costs (Cade *et al*, 1999; Drewnowski, Darmon and Briend,

2004). Low income groups generally have a more restricted food budget, and fruit and vegetables may be overlooked in favour of more energy-dense foods. However, other researchers claim that healthier diets need not increase dietary costs (Frazao and Allshouse, 2003; Raynor, 2002).

A survey conducted in New Zealand to determine fruit and vegetable consumption indicated that many New Zealanders do not consume the recommended daily intake of fruit and vegetables (Ashfield-Watt, Stewart and Scheffer, 2004). Furthermore, the most common barrier perceived to consuming fruit and vegetables were their cost and rapid spoilage (Barnfather, 2004). Therefore, the aim of this study was to conduct market research on the price of the selected fresh and processed fruit and vegetables to determine the daily cost of meeting the 5-A-Day initiative in New Zealand.

Methodology

In 1994, to encourage increased public awareness of the importance of fruit and vegetables in the diet, *United Fresh* promoted a daily intake minimum of five portions, this meant most New Zealanders should consume a minimum of two servings of fruits and three servings of vegetables per day thus giving rise to the slogan '5+-A-DAY'. To determine the cost of meeting this objective, four waves of data collection were conducted over a period of one year to reflect seasonal variations in prices. Previous studies indicated that winter was negatively associated with vegetable intake (Van Staveren, Deurenburg, Burema, de Groot, Hautvast, 1986; Ziegler, Wilcox, Mason, Bill, Virgo, 1987). This may result from both seasonal availability and price of locally produced fruit and vegetables.

Additionally, one wave of data collection on the processed fruit and vegetables was conducted as their prices are thought to be less influenced by seasonal variations. Four leading food stores (*New World, Pak 'N' Save, Countdown, Woolworths*) and one small food store (*4 Square*) were selected to reflect differences in stores prices. It was intended to be a "snapshot" to capture the prices and availability of fruit and vegetables to consumers.

Calculation of fruit and vegetables prices

In measuring the servings of fruit and vegetables, the recommended daily intake of 80g (total 400g) of fresh, frozen, or canned fruit and vegetables and 30g of dried fruit promoted by the World Health Organisation (1990) was adopted. To establish the price unit/80g and unit/30g, two different strategies were applied:

1. The items sold on price per kilogram were converted by dividing the price by 1000 to give price per 1g, and then multiplied by 80 for fresh, frozen or canned products or 30 for dried products.
2. The items sold on weight basis were converted by dividing the actual weight in grams and multiplying by 80 for fresh, frozen or canned products or 30 for dried products.

There were several forms of foods excluded in the assessment. The fruit and vegetables were restricted to the most common fresh fruit and vegetables, excluding exotic items such as bok choy, guavas and lychees. Similar to other studies examining fruit and vegetable intakes, potatoes and other related root vegetables (considered as 'starchy' food), tomatoes (in ketchup), and fruit (in sauces) were excluded and not assessed as part of the total daily intake (Giskes et al., 2002; Roos, Johansson, Kasmel, Klumbeine and Prattala, 2001)

Comparing fresh and processed fruit and vegetables

To determine whether fresh fruit and vegetables are more expensive than processed, this study compared prices for 16 vegetables and 14 fruits for which prices were available for both fresh and processed forms. For comparison, the fresh fruit and vegetables were matched with their plain unsweetened, unflavoured, processed counterparts. In addition, for each fresh item, the average price from the five food stores was calculated and compared with the average price for the processed item.

In the final analysis, there were 41 different fresh fruit and vegetables and 58 processed fruit and vegetables recorded. Among the processed fruits and vegetables, there were 18 frozen, 12 dried, and 28 canned fruit and vegetables selected from 43 different brands.

Results

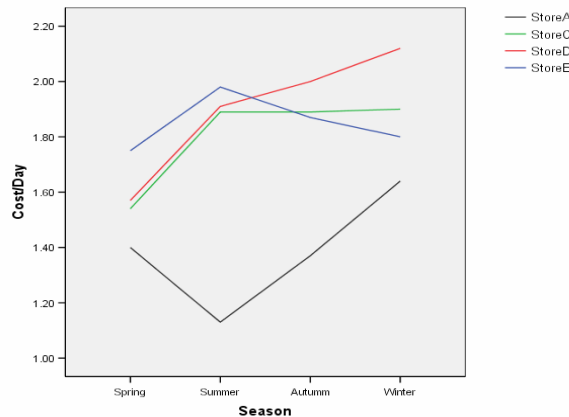
Between the five supermarkets, there was a wide variation in prices for fruit and vegetables both in fresh and processed forms. Overall, fresh fruit and vegetables were least expensive in the summer, with fruit prices ranging from 10 cents per serving for bananas to \$1.20 per serving for strawberries ($M=35.6$ cents). The vegetables ranged from 4 cents per serving for cabbage to \$1.77 per serving for asparagus ($M=32.2$ cents). In winter the fresh fruit ranged from 7 cents per serving of kiwifruit to \$1.33 per serving for strawberries ($M=32.4$ cents) and vegetables ranged from 7 cents per serving for pumpkin to 95 cents per serving for beans ($M=38.3$ cents). Only four fruits (plums, strawberries, nectarines, and apricots) and four vegetables (asparagus, beans, brussels sprouts, and green peppers) cost more than the weighted average price.

The total cost of meeting the 5-A-Day initiative in the five selected stores ranged from \$1.40-\$1.97 (spring), \$1.13-\$1.98 (summer), \$1.37- \$2.00 (autumn), and \$1.64- \$2.12 (winter) per person. There was no significant difference in the price of fresh fruit and vegetables between seasons after the sale items were calculated into the daily cost $F(3, 16) = .256, p>.05$. There is now year-round availability of imported fruit and vegetables in New Zealand. Seasonality is no longer such an issue as it used to be. However, there was evidence of a significant difference between food stores, $F(4, 15) = 4.67, p=.012$. Figure 1 show the cost of meeting the 5-A-Day from the four leading food stores with store A being the cheapest.

The prices for 10 different types of canned vegetables ranged from 20 cents per serving of beetroot to \$1.06 per serving for peppers ($M=45$ cents). The 13 different types of frozen vegetables ranged from 22 cents per serving for peas to 93 cents per serving for spinach ($M=43.1$ cents). Three types of dried vegetables ranged from 32 cents per

serving for peas to 43 cents per serving for mixed vegetables ($M=33.3$ cents). The fresh vegetables were slightly cheaper than the processed one but it did not reach statistical significance. The prices for 10 different types of canned fruit ranged from 19 cents per serving for pineapple to 77 cents per serving for blueberries ($M=36.8$ cents). The prices for the 11 types of dried fruit ranged from 13 cents per 30g for dates to 90 cents per 30g for peaches ($M=36.8$ cents). The three types of frozen fruit ranged from 69 cents per serving for raspberries to 1.08 per serving for blueberries ($M=82.3$ cents). Again there was no statistical significance between fresh and processed fruit.

Figure 1. Cost of 5-A-Day initiative in the selected four leading food stores.



The results indicated that there was no one form as being the cheaper way of eating fruit and vegetables. However, with a more careful examination of the individual items, the results indicated that in the summer, many items of vegetables were cheaper in their fresh form than the processed counterparts, such as cauliflowers ($t=14.6$ $p=.00$), carrots ($t=10.4$ $p=.00$), spinach ($t=3.3$ $p=.016$), corn ($t=7.1$ $p=.00$), and broccoli ($t=5.2$ $p=.004$). Only beans were cheaper in the processed form ($t=6.5$ $p=.008$). In winter, canned tomatoes ($t=4.61$ $p=.002$), corns ($t=6.0$ $p=.001$), beans ($t=2.9$ $p=.028$) and frozen corns ($t=4.7$ $p=.002$) and spinach ($t=2.3$ $p=.055$) were found to be cheaper than fresh counterparts. Similarly, many items of fresh fruit such as apple ($t=4.23$ $p=.006$), pears ($t=2.00$ $p=.051$), pineapple ($t=4.67$ $p=.17$) were cheaper in summer than processed form. With the exception of strawberries ($t=2.81$ $p=.037$) some items of canned fruit were cheaper than their fresh form in the winter but, surprisingly, they did not reach statistical significance. Frozen fruit was always the most expensive ($t=2.5$ $p=.02$).

Discussion and Conclusions

The present study extends the research that cost concerns represent a barrier to the consumption of more fruit and vegetables. The data show that New Zealand consumers can eat five portions of fresh fruit and vegetables daily for NZ\$1.13 in summer (the cost of a typical chocolate bar) to NZ\$2.12 in winter (the cost of a typical packet of biscuits). The results show that there is now year-round availability of imported fruit and vegetables and seasonality is no longer such an issue as it used to be.

An expectation of fresh fruit and vegetables to be more expensive than processed fruit and vegetables was not supported in this study. Although the results indicated price differences for different forms produce, the cost-per-serving difference was insignificant. There were some processed items that were cheaper than their fresh counterparts and with the inclusion of these selected items into the daily intake, consumers could meet the 5-A-Day initiative for even less and not feel constrained by the limitations of fruit and vegetables being expensive or perishable. Furthermore, research indicated that fresh, frozen, and canned foods are nutritionally comparable (Breene, 1994). Tobias and colleagues (2006) have identified that, even modest increases in the consumption of fruit and vegetables for New Zealanders are calculated to significantly decrease mortality rates associated with poor nutrition.

The results pose important questions about the consumption of fruit and vegetables. First, can consumers realistically meet the recommended five portions of fruit and vegetables a day, even amongst low income groups in New Zealand? Previous research with reference to socio-economic group differences in fruit and vegetable consumption suggests interventions such as subsidies for low income groups can be effective to counter a more restricted food budget, and the tendency for fruit and vegetables to be overlooked in favour of more energy-dense foods (Darmon, Darmon, Maillot & Drewnowski, 2005). Incentives for industry to improve local access to fruit and vegetables at affordable prices in low-income areas may also be effective as there are greater difficulties in access to large supermarkets if consumers lack private transport or live in areas where public transport is inadequate (Jago, Baranowski, Baranowski, Cullen & Thompson, 2007; Kamphuis, et al., 2006). In such regions, consumers are more reliant on smaller shops, which typically stock a limited range of foods, often have higher prices than larger supermarkets and may have more limited fresh food possibly of poorer quality (Ellaway and Macintyre, 2000)

A better understanding of the mechanisms underlying socio-economic group differences in fruit and vegetables intake deserves further consideration. Earlier research indicated that the cost of fruit and vegetable did not represent a barrier to healthy eating, and consumers were able to budget for what they buy habitually. However, if consumers were asked to increase consumption and buy more, they would find this too costly (Disdall, *et al*, 2003). In 2003-2004, the average weekly household food expenditure in New Zealand on fresh fruit was \$5.90 and fresh vegetables was \$8.00 (Ministry of Health 2006).

From the results of this study, the daily cost/per person of 5-A-Day initiative would appear to be affordable. However, a household of four would need to spend between \$31 and \$59 each week to meet the 5+-A-Day target for all household members (or between \$8 and \$15 per person). The 2003 food cost survey data identified weekly food costs for adult men and women to be \$50-\$75 and \$48-\$72 respectively (Ministry of Health 2006). Economic modelling of food budget constraints suggest having less income orientates food choices towards energy dense foods which are lower in essential nutrients and away from consumption of fruit and vegetables (Maillot, Darmon, Darmon, Lafay and Drewnowski, 2007)

Additionally, consumers tend not to respond to changes in prices of fruit and vegetables ((Huang and Lin, 2000) and an increase in household income does not necessarily lead to increased expenditure on these items (Disdall *et al*, 2003; Stewart, Blisard and Joliffe, 2003) A large study of cancer prevention knowledge in the USA indicated that consumers with lower incomes and education levels were less likely to make changes to their current diet, despite it being less consistent with recommended dietary guidelines.⁵⁷

Surveys indicate that although there is increasing awareness of the recommendations to increase fruit and vegetable consumption, less than half of the United Kingdom (UK) population consumes the recommended amounts (Department of Health, 2001; Food Standards Agency, 2002) likewise, about two thirds of the people in the United States do not eat the recommended amounts of fruit and vegetables (Casagrande, Wang, Anderson, and Gary, 2007). Similarly, in an Australian study, the fruit and vegetable intakes of all economic groups were less than half of the recommended daily intake (Giskes, *et al*, 2002). From the Ministry of Health report (2006) indicating that the average weekly household food expenditure on fresh fruit was \$5.90 and fresh vegetables was \$8.00, it is clear that many New Zealanders do not consume the daily recommended intakes of fruit and vegetables. Worldwide, there are fundamental barriers to consuming the recommended amounts of fruit and vegetables which need to be identified.

In interpreting the results, an important limitation has been taken into account. The method used in this study underestimates the costs of the amount of fruit and vegetables actually eaten by including the nonedible portions in the total cost per serving, for example peach piths, avocado stones, watermelon rinds, and canning liquid in peas and beans. The findings of this study are relevant to future research of fruit and vegetable intake, but demonstrate the complexity of intervention required as low intake of fruit and vegetables is more complex than simply a factor of cost. Individuals taking part in research studies may regard citing cost as a barrier to consumption to be the most socially acceptable reason. Further qualitative research should investigate why people are unmotivated to increase their fruit and vegetable intake, despite the fact that health benefits associated with fruit and vegetables are vigorously promoted and understood.

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