

# Longitudinal study of Consumer Price Index (CPI) trends in core and non-core foods in Australia

## Abstract

**Objective:** This study examined trends in the price of healthy and less-healthy foods from 1989 to 2007 using the Australian Consumer Price Index (CPI).

**Methods:** CPI food expenditure classes were classified as 'core' or 'non-core'.

Trends in the CPI were analysed to examine the rise in prices of core compared with non-core foods.

**Results:** On average, the CPI for core foods has risen at a slightly higher, though not statistically significant, rate than non-core foods. Furthermore, selected groupings reveal interesting patterns. 'Bread' has risen in price significantly more than 'cakes and biscuits', and 'milk' has risen in price significantly more than 'soft drinks, waters and juices'.

### Conclusions and implications:

This investigation of food price trends reveals notable differences between core and non-core foods. This should be investigated further to determine the extent to which this contributes to the higher prevalence of diet-related diseases in low socio-economic groups.

**Key words:** public health, food, economics, nutrition policy, food supply.

*Aust N Z Public Health.* 2008; 32:449-52  
doi: 10.1111/j.1753-6405.2008.00278.x

## Cate Burns, Gary Sacks

*WHO Collaborating Centre for Obesity Prevention, Faculty of Health, Medicine, Nursing and Behavioural Sciences, Deakin University, Victoria*

## Lisa Gold

*School of Health and Social Development, Deakin University, Victoria*

In Australia and internationally, the prevalence of diet-related diseases, such as obesity, is increasing across the socio-economic spectrum (SES).<sup>1</sup> Though in Australia and other middle- and high-income countries, obesity prevalence is higher in lower SES groups.<sup>2</sup> While the determinants of the relationship between socio-economic disadvantage and obesity are not well-understood,<sup>3</sup> there is strong evidence that food purchases are influenced by food costs, particularly for people in low-income brackets.<sup>4</sup>

It has been shown that those with fewer economic resources are less likely to be compliant with recommendations for healthy eating.<sup>5</sup> It is hypothesised that higher costs of healthy foods relative to lower costs of less-healthy foods are driving the high prevalence of diet-related diseases in low-income populations.<sup>6</sup>

There have been a number of studies in Australia of the cost of a healthy diet using the healthy food access basket methodology.<sup>7</sup> Analyses of the Healthy Food Access Basket (HFAB) study from 1998 to 2004 indicated that the cost of healthy food has increased in Australia.<sup>8</sup> However, there are limited data looking at the relative cost of core foods which are considered essential for health and non-core foods. In Australia, the price of food is monitored through determination of the Consumer Price Index (CPI). Every four months the price of a representative basket of 11 groups of goods and services, including food, is collected by the Australian

Bureau of Statistics (ABS) and made freely available to the public in aggregated form. While the CPI data are not collected with a direct focus on health, the food group covers all core food groups as well as foods which are less-healthy (or non-core). This study aimed to examine trends in the price of core and non-core foods over the time period 1989 to 2007 using the CPI. Our hypothesis was that the CPI for core foods has increased more than that for non-core foods.

## Methods

The CPI is an index number measuring the average price of consumer goods and services purchased by households, with the per cent change in the CPI commonly used as a measure of inflation. The Australian CPI measures quarterly changes in the price of a 'basket' of goods and services which account for a high proportion of expenditure by metropolitan households in Australia.<sup>9</sup>

This study focused on the food group of the CPI which is further sub-divided into 26 expenditure classes.<sup>8</sup> We classified the expenditure classes as 'core' (i.e., essential part of a nutritious diet) or 'non-core' (i.e., not essential and considered to be energy-dense and nutrient-poor) on the basis of nutritional value using criteria set down in the Australian Guide to Healthy Eating.<sup>10</sup> Linear trends in the CPI for food (weighted average of eight capital cities, base 1990) were analysed for the period from September 1989 to September 2007.

**Submitted:** October 2007

**Revision requested:** February 2008

**Accepted:** August 2008

### Correspondence to:

Dr Cate Burns, WHO Collaborating Centre for Obesity Prevention, Faculty of Health, Medicine, Nursing and Behavioural Sciences, Deakin University, 221 Burwood Highway, Burwood Victoria 3125. Fax: (03) 9244 6640; e-mail: cate.burns@deakin.edu.au

Of the 26 food expenditure classes, 15 were classified as core: milk, cheese, bread, breakfast cereals, other cereal products, beef, lamb, pork, poultry, bacon and ham, processed meats, fish, fruit, vegetables, eggs. Eleven were classified as non-core: ice cream and other dairy products; cakes and biscuits, soft drinks, waters and juices, snacks and confectionery, restaurant meals, take away and fast foods, jams, honey and sandwich spreads, tea, coffee and food drinks, food additives and condiments, fats and oils, food not elsewhere classified.

All prices (indexes) were log transformed. Using Ordinary Least Squares (OLS) and correcting for auto-correlation using the Newey-West method, regression co-efficients were derived between the years 1989 and 2007 for each of the 26 food expenditure classes, for the food group overall and for all expenditure classes classified as core (n= 15) and non-core (n=11). The regression co-efficient represents the linear trend for average CPI per quarter.

A Wald test was then carried out to test whether the average percentage increases in the price per quarter for each of the food expenditure classes were statistically significantly different from the average percentage increase in the price per quarter for food overall. Results were considered statistically significant for a *p*-value < 0.05.

The average percentage increase in price of selected core and non-core foods were then compared for two specific food choices: a meal or snack (bread vs cakes and biscuits) and a beverage (milk vs soft drinks, waters and juices). All analysis was carried out using Eview.

## Results

The average percentage increase in price per quarter for food overall for the period 1989-2007 was 0.7779%. Table 1 shows that the average percentage increase in price per quarter of the following core food categories were significantly higher than the average percentage increase in price per quarter of food overall: milk, cheese, bread, breakfast cereals, lamb, poultry, fish and eggs. The mean percentage increase in price per quarter for core foods (0.7556%) was slightly higher than that for non-core foods (0.6996%) though this difference was not statistically significant.

The analyses of key groupings show important differences between selected core and non-core expenditure classes. For example, Figure 1 indicates price trends for bread and for cakes and biscuits, while Figure 2 indicates price trends for milk and soft drinks, waters and juices.

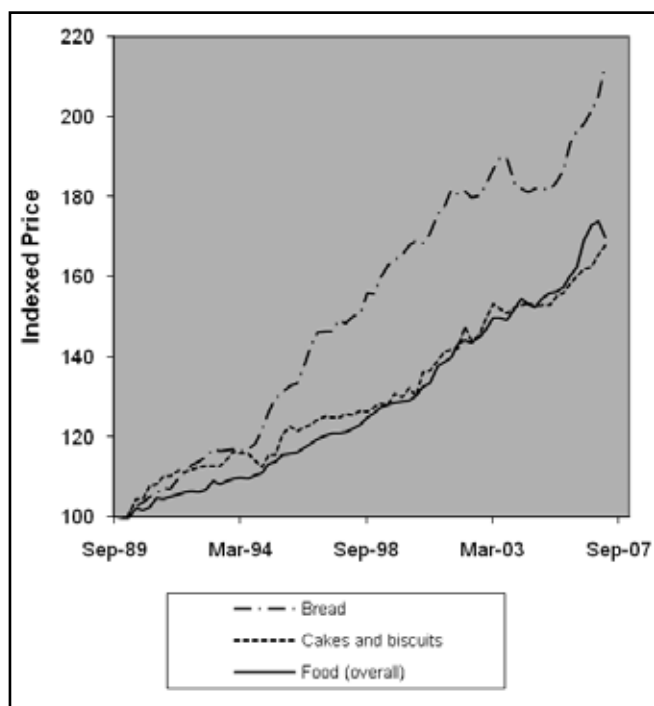
**Table 1: Results of regression of adjusted log transformed CPI data from 1989 to 2007 and Wald test results for statistical comparison of co-efficient for each food expenditure class compared with the co-efficient for food overall. Results for Wald test given as F-Statistic and probability of F-Statistic.**

Food expenditure class	Classification	Co-efficient ( $\beta$ )	F Statistic	F Statistic Probability
Bacon and ham	Core	0.0055	76.99	0.0000 <sup>a</sup>
Beef and veal	Core	0.0076	0.03	0.8580
Bread	Core	0.0108	45.97	0.0000 <sup>a</sup>
Breakfast cereals	Core	0.0047	74.62	0.0000 <sup>a</sup>
Cheese	Core	0.0056	16.92	0.0001 <sup>a</sup>
Eggs	Core	0.0109	28.81	0.0000 <sup>a</sup>
Fish and other seafood	Core	0.0050	53.04	0.0000 <sup>a</sup>
Fruit	Core	0.0099	2.33	0.1313
Lamb and mutton	Core	0.0126	31.03	0.0000 <sup>a</sup>
Milk	Core	0.0093	30.85	0.0000 <sup>a</sup>
Other cereal products	Core	0.0053	198.42	0.0000 <sup>a</sup>
Other fresh and processed meat	Core	0.0074	1.00	0.3209
Pork	Core	0.0083	0.84	0.3640
Poultry	Core	0.0014	108.77	0.0000 <sup>a</sup>
Vegetables	Core	0.0091	1.38	0.2442
Cakes and biscuits	Non-core	0.0069	19.59	0.0000 <sup>a</sup>
Fats and oils	Non-core	0.0067	4.46	0.0384 <sup>a</sup>
Food additives and condiments	Non-core	0.0042	242.69	0.0000 <sup>a</sup>
Food n.e.c.	Non-core	0.0058	107.40	0.0000 <sup>a</sup>
Ice cream and other dairy products	Non-core	0.0082	2.04	0.1575
Jams, honey and sandwich spreads	Non-core	0.0085	4.55	0.0364 <sup>a</sup>
Restaurant meals	Non-core	0.0086	8.43	0.0049 <sup>a</sup>
Snacks and confectionery	Non-core	0.0094	185.05	0.0000 <sup>a</sup>
Soft drinks, waters and juices	Non-core	0.0050	67.21	0.0000 <sup>a</sup>
Take away and fast foods	Non-core	0.0075	0.66	0.4204
Tea, coffee and food drinks	Non-core	0.0062	6.49	0.0131 <sup>a</sup>
<b>Food overall</b>		<b>0.0078</b>		

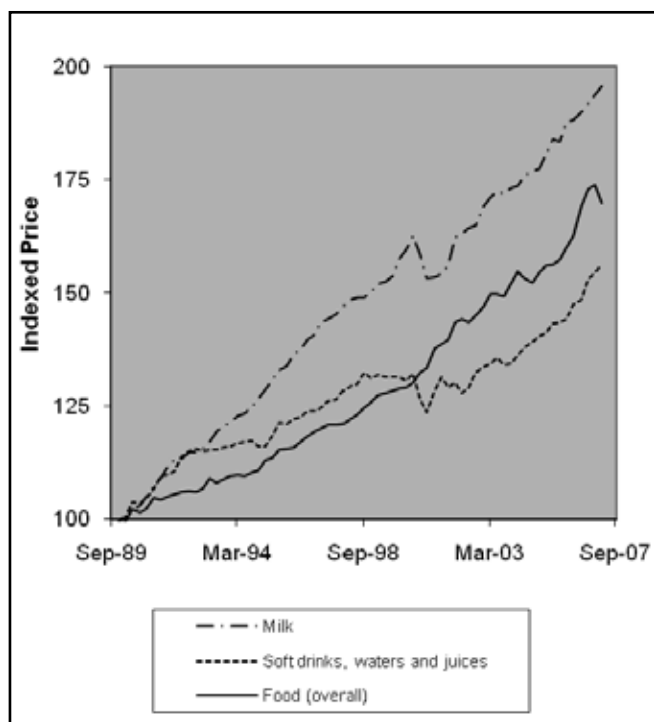
Note:

(a) indicates statistical significance for *p*<0.05.

**Figure 2: Change in Consumer Price Index (CPI) (weighted average of eight capital cities, base 1990) for selected expenditure classes: 'bread' (core) and 'cakes and biscuits' (non-core), 1989-2007.**



**Figure 2: Change in Consumer Price Index (CPI) (weighted average of eight capital cities, base 1990) for selected expenditure classes: 'milk' (core) and 'soft drinks, waters and juices' (non-core), 1989-2007.**



## Discussion

The analysis reported here uses publicly available empirical data to show interesting differences in the way that prices of core and non-core foods have changed over time. On average, at the level of expenditure class across all categories of food in the CPI, core foods have risen in price at a slightly higher (though not statistically significant) rate than non-core foods. However, a focus on key groupings lends support to the hypothesis that, for some categories of food, non-core foods are becoming increasingly cheaper options than core foods. Given price is a strong determinant of food purchase,<sup>4</sup> this finding has significant implications for public health nutrition interventions which aim to improve the intake of core foods in accordance with the Australian Guide to Healthy Eating.<sup>9</sup> It is important that we determine the causes of these price differentials. The CPI data set could, with improvement, be used for a national monitoring system of the price of food.

Evidence is emerging that the global price of food is increasing.<sup>11</sup> The reasons for these price increases include the changing of food preferences in large developing economies such as China and the increasing use of crops, such as maize, for biofuels. In Australia, the trend of rising food prices has recently been exacerbated by years of extended drought conditions. Further investigation is warranted into the higher relative change in the price of core compared with non-core foods as demonstrated in this study.

It is recognised that these results have certain data and analysis limitations. Firstly, the data has been analysed at an aggregate level (i.e., expenditure class) rather than at a product level. The level of expenditure class is the lowest level of data available from the ABS, who are not able to disclose more detailed product-level information in order to protect the integrity of the CPI (personal communication, ABS, September 2007). While product price information is available for purchase from private commercial databases, this is beyond the scope of this research project.

Other limitations result from the use of aggregate data. The use of aggregate data can mask important variation within expenditure classes. For example, production costs of new products (such as bottled water) are likely to decrease over time and may lead to declining consumer prices for these products over time. By grouping a diverse set of products under the same expenditure class, these variations are not clearly evident. Nevertheless, this study can be considered exploratory, with the patterns that emerge from the analysis highlighting areas for further investigation.

Finally, it is acknowledged that there are nutritional limitations in the classification of CPI food expenditure classes as core and non-core. For example, the expenditure class 'soft drinks, waters, and juices' includes water (considered core) as well as soft drinks (considered non-core). Our classification is based on the weighted expenditure within each class, which assigns each expenditure class to represent either healthy or less healthy foods. Again, the analysis presented here proves useful in highlighting areas for more detailed investigation of classification approaches.

## Conclusion and implications

This study indicates that many core foods are rising in price at a rate higher than that of inflation for food overall. Furthermore, there are significant differences in price trends for specific expenditure classes which may impact on the consumption of core foods endorsed and encouraged by the Australian Guide to Healthy Eating.<sup>10</sup> This study highlights the need to monitor the cost of a healthy diet and specific core foods. It also points to the need to establish budgetary food standards so that the cost of a healthy diet can be factored into health and social policies. There is an imperative to undertake these initiatives given the environmental strains on our food supply and the realities of a globalised food system.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

CB initiated the study, jointly developed the major concepts and reviewed the manuscript. GS performed the data analysis and drafted the manuscript. LG jointly developed the major concepts and reviewed the manuscript. All authors read and approved the final manuscript.

## Acknowledgements

The authors would like to thank Professor Sing Kai Lo from Deakin University, Dr Guay Lim and Alison Goode from the Melbourne Institute for Social and Economic Research for assisting with the statistical data analysis.

## References

1. World Health Organisation. *Reducing Risks, Promoting Healthy Life* [Report]. Geneva (CHE): WHO; 2002.
2. AIHW. A growing problem. Trends and patterns in overweight and obesity among adults in Australia, 1980 to 2001. *Bulletin*. 2003;1-19.
3. Marmot M. Social determinants of health inequalities. *Lancet*. 2005;365(9464):1099-104.
4. Lennernas M, Fjellstrom C, Becker W, Giachetti I, Schmitt A, Remaut de Winter A, et al. Influences on food choice perceived to be important by nationally-representative samples of adults in the European Union. *Eur J Clin Nutr*. 1997;51 Suppl 2:8-15.
5. Mishra G, Ball K, Arbuckle J, Crawford D. Dietary patterns of Australian adults and their association with socioeconomic status: results from the 1995 National Nutrition Survey. *Eur J Clin Nutr*. 2002;56(7):687-93.
6. Drewnowski A, Specter SE. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr*. 2004;79(1):6-16.
7. Burns C, Friel S. It's time to determine the cost of a healthy diet in Australia. *Aust N Z J Public Health*. 2007;31(4):363-5.
8. Harrison M, Coyne R, Lee AJ, Leonard D, Lowson S, Groos A, et al. The increasing cost of the basic foods required to promote health in Queensland. *Med J Aust*. 2007;186(1):9-14.
9. Australian Bureau of Statistics. *Australian Consumer Price Index: Concepts, Sources and Methods*. Canberra (AUST): ABS; 2005. Catalogue No.: 6461.0
10. Department of Health and Ageing. *The Australian Guide to Healthy Eating*. Canberra (AUST): Commonwealth of Australia; 1998.
11. The End of Cheap Food. *The Economist*. 2007 December 6.