Purchase rates and energy content of nutritionally promoted and traditional fast foods purchased at lunchtime in Australia – a pilot study

Louise F Atkinson1 and Michelle A Palmer1,2,∗
1School of Public Health, Griffith University, Gold Coast, QLD 4222, Australia; 2Research Centre for Clinical and Community Practice Innovation, Griffith Health Institute, Griffith University, Queensland, Australia

Submitted 6 December 2010: Accepted 20 May 2011: First published online 20 July 2011

Abstract

Objective: Nutritionally promoted foods are now available at fast-food establishments. Little is known about their popularity, who is purchasing them, or their impact on dietary intake. Our study aimed to determine: how often nutritionally promoted fast foods were purchased; the demographic characteristics of people purchasing these foods; and if purchasing these foods resulted in reduced energy, and increased vegetable content of lunches compared with those who purchased traditional fast foods.

Design: A survey collecting lunchtime fast-food purchases and demographic details was administered over two months. Nutritionally promoted products included the McDonalds’ ‘Heart Foundation Tick Approved’ range and Subway’s ‘Six grams of fat or less’ range. Energy and vegetable contents were estimated using information from fast-food companies’ websites. Differences in demographics, energy and vegetable contents between individuals purchasing nutritionally promoted and traditional lunches were assessed using χ2 and t tests.

Setting: Queensland, Australia.

Subjects: Lunchtime diners aged over 16 years at Subway and McDonalds.

Results: Surveys were collected from 927 respondents (58% male, median age 25 (range 16–84) years; 73 % response rate). Only 3% (n 24/910) of respondents who ordered a main option had purchased a nutritionally promoted item. Purchasers of nutritionally promoted foods were 13 years older, predominantly female (79%) and more often reported involvement in a health-related profession (29%) than purchasers of traditional foods (P<0.05). Purchasers of nutritionally promoted foods ordered 1.5 fewer megajoules and 0.6 more vegetable servings than purchasers of traditional foods (P<0.05).

Conclusions: Nutritionally promoted fast foods may reduce lunchtime energy content, however these foods were infrequently chosen.

Keywords
Take-away
McDonalds
Subway
Vegetables

One in three Australians consumes food prepared outside the home every 24h, with these foods contributing over one-third of total 24h energy intake(1). Fast foods tend to be high in energy, and a poor source of fibre and micronutrients(2–5). The significant contribution of energy-dense fast foods to the average diet has prompted concern that fast foods contribute to an obesogenic environment(4,6–9).

Fast-food establishments may have introduced nutritionally promoted fast foods (NPFF) to respond to public demand, address public concern regarding the limited health value of fast foods, or to demonstrate corporate responsibility(10–12). NPFF include the ‘Tick Approved’ options endorsed by the National Heart Foundation at McDonalds, and a range of sandwiches bearing a ‘Six grams of fat or less’ claim at Subway(11,13).

Actual purchase rates of NPFF have not been independently reported. Media articles and company reports suggest 15% of revenue from these options(14) with 19% of customers reporting purchasing these options at McDonalds(15). However, these purchase rates were reported soon after their introduction to menus(14) and there isn’t any evidence... to tell us that these healthy options have become the default(16). Independent research is needed to determine current purchase rates.

Previous research on who purchases NPFF was not located. Females and older diners may be more likely to purchase fast foods they consider healthier(17–19). In contrast, frequent fast-food consumers are typically younger than 40 years, male, and have poorer knowledge of the ‘diet–disease relationship’. Investigation of

*Corresponding author: Email missshell1@hotmail.com
© The Authors 2011
who is purchasing NPFF will provide valuable information on who accesses, and potentially benefits from, improvements to the nutrient content of fast foods.

The energy and vegetable contents of NPFF purchases have not previously been published. Purchasers of NPFF may be influenced by a ‘health halo effect’, which is where consumers estimate main choices promoted as ‘healthy’ to be lower in energy and are therefore more likely to compensate for this by purchasing additional energy-dense, nutrient-poor accompaniments with these mains; for example, more likely to purchase a cookie because a Subway sandwich with 6 g or less of fat was purchased. Research measuring the energy content of purchases made in conjunction with NPFF will identify whether purchasing these options has the potential to assist with reducing energy intake.

Independent research measuring purchase rates of NPFF is needed. As such, the aims of the current pilot study were to: (i) identify purchase rates of NPFF at two major fast-food chains; (ii) determine if there were differences in demographics or reasons for purchase between purchasers of NPFF and purchasers of traditional fast foods; and (iii) investigate whether purchasing NPFF resulted in reduced energy, and increased vegetable, content at lunch compared with those purchasing traditional fast foods.

Methods

Sample
Listings of Gold Coast stores for McDonalds and Subway, two of the largest fast-food retailers in Australia, were sourced from company websites and in-store visits. The Griffith University Human Research Ethics Committee approved this project prior to data collection. Recruitments and survey collection

Researchers systematically moved through dining areas so that diners had an equal chance of being invited to participate. Eligible diners were asked if they would like to complete a short survey using a standard script. The survey was piloted extensively prior to data collection. The survey gathered demographic information such as age, gender, involvement in a health profession, number of fellow diners and relationship with fellow diners. Respondents recorded their current lunchtime purchases on the survey as the entire menu available at the specific chain was listed. Menu information was sourced from company websites and in-store visits. Respondents also ticked any applicable reasons for their purchase from a list of taste, convenience, cost, health/nutritional content, favourite food, or other reason. The survey also gathered information about foods or drinks which were not purchased from the store of interest, as well as planned subsequent lunch purchases. Researchers regularly cross-checked completed surveys with observed food and drink items. Responses that were not reflective of observed purchases were excluded.

Researchers recorded the gender, age in estimated decade and number of fellow diners for each non-responder. Non-responders included those who declined participation and those who provided incorrect or incomplete lunchtime purchase information.

Recruitment and survey collection

Researchers systematically moved through dining areas so that diners had an equal chance of being invited to participate. Eligible diners were asked if they would like to complete a short survey using a standard script. The survey was piloted extensively prior to data collection. The survey gathered demographic information such as age, gender, involvement in a health profession, number of fellow diners and relationship with fellow diners. Respondents recorded their current lunchtime purchases on the survey as the entire menu available at the specific chain was listed. Menu information was sourced from company websites and in-store visits. Respondents also ticked any applicable reasons for their purchase from a list of taste, convenience, cost, health/nutritional content, favourite food, or other reason. The survey also gathered information about foods or drinks which were not purchased from the store of interest, as well as planned subsequent lunch purchases. Researchers regularly cross-checked completed surveys with observed food and drink items. Responses that were not reflective of observed purchases were excluded.

Researchers recorded the gender, age in estimated decade and number of fellow diners for each non-responder. Non-responders included those who declined participation and those who provided incorrect or incomplete lunchtime purchase information.

Classifying nutritionally promoted and traditional foods

Respondents were considered purchasers of NPFF if, regardless of other purchases, they had purchased a nutritionally promoted option, either as a main or as part of a meal. By default respondents were classified as purchasers of traditional foods if they had not purchased any nutritionally promoted mains or meals. NPFF included: the McDonalds’ ‘Heart Foundation Tick Approved’ range which contains five meal options and two wraps; and Subway’s ‘Six grams of fat or less’ range which includes nine sandwiches with different toppings and two ‘Fresh Fit’ meals. The nine Subway sandwiches meet the ‘6 grams of fat or less’ claim only if white or wholemeal bread is ordered and cheese or high-fat sauces are not added. Purchase rates of NPFF at Subway were therefore measured using both ‘strict’ and ‘relaxed’ criteria. When the strict criteria were applied, purchasers of NPFF were those who ordered only ‘6 grams of fat or less’ options without cheese, high-fat sauce, and on only white or wholemeal bread. When the relaxed criteria were applied, purchasers of NPFF ordered any ‘6 grams of fat or less’ option, regardless of the bread, cheese or sauce chosen.

All burgers, sandwiches, wraps, nuggets and full size salads (e.g. McDonalds’ garden salads) were considered main choices. All sides and drinks were considered complementary choices. Side dishes included desserts, fries and side salads. Diners who purchased only sides or...
drinks, without a main or a meal, were not classified as purchasers of either traditional or NPFF and were excluded from further analysis.

**Nutritional content of lunchtime purchases**

Energy content of menu items from both chains was sourced primarily from company websites\(^{13,27}\), as well as nutrition information panels and Foodworks\textsuperscript{®} 2007 software (Xyris Software (Australia) Pty, Highgate Hill, Australia). The survey clarified whether soft drinks ordered were standard or artificially sweetened; however, specific flavours of sides and drinks were not detailed on the surveys. The flavour containing the lowest energy content was used to analyse sides or drinks. However, due to its popularity, the energy content from standard and artificially sweetened Coca-Cola was used for all standard and artificially sweetened soft drinks purchased, respectively.

The weight (g) of standard vegetable servings at Subway was sourced from its website\(^{13}\). For McDonalds, the weight of salad portions in each food item was weighed individually using Homemaker digital kitchen scales (model 9757; made in China for Kmart Australia Limited) with 1 g gradation. Due to cost and time constraints, each salad portion was weighed once only. Actual weights of each vegetable were converted into a vegetable serving using Australia’s food selection guide, which considered one serving of vegetables to weigh 75 g\(^{20}\). Tomatoes and pickles were classified as vegetables.

**Statistical analyses**

Ten per cent of survey data was independently checked for data entry accuracy. All analyses were conducted using the SPSS statistical software package version 18.0 (SPSS Inc., Chicago, IL, USA). Gender, age in decades and number of fellow diners were compared between responders and non-responders using \(\chi^2\) analyses. The \(\chi^2\) test, or Fisher’s exact test, was used to assess whether purchasers of NPFF and purchasers of traditional items differed by gender, number of people ordering drinks or sides, number and relationship of people dining with, reasons for purchase, and involvement in a health-related profession. The independent-samples \(t\) test was used to assess whether differences in energy content existed between groups. The Mann–Whitney \(U\) test was used to assess differences between groups for age and number of vegetable servings purchased.

**Results**

Approximately 90% of eligible McDonalds and 37% of eligible Subway stores on the Gold Coast were approached (Fig. 1). Six store managers declined survey administration in their store. Most (4/6) cited not wanting their customers disturbed as the reason for refusal. Two-thirds (65%) of all Subway respondents were surveyed in Brisbane. Two-fifths (39%) of all Subway respondents were surveyed on a Brisbane university campus. At the majority (83%) of stores visited, all diners present during data collection were approached.

Non-responders represented 27% of eligible diners approached (Fig. 1). Reasons for non-participation included a reported lack of time, not being interested and language barriers. Ninety-eight respondents were excluded as they were aged <16 years.

The majority (86%) of responders were aged between 16 and 49 years, with a median age of 25 years (range 16–84 years). Older adults (>50 years) were less likely to participate, and people aged 16–29 years were more likely to participate (\(P<0.05\)). The proportion of males was similar between non-respondents (55%) and respondents (58%). Subway diners were 12 years younger than McDonalds’ diners (\(P<0.05\)). Median age at each chain remained different even when the Subway university sample was removed (\(P<0.05\)).

Three-quarters (75%) of responders were dining with others (Table 1). McDonalds’ responders were more likely to be dining with two or more others and less likely to be dining alone than the Subway sample (\(P<0.05\)). Removing the Subway university sample did not alter the differences in the proportions of fellow diners found between chains. One-quarter (27%) of participants reported dining with family and were older (median 37 (range 16–78) years) than those not dining with family (median 23 (range 16–84) years, \(P<0.05\)). Subway participants were also less likely to be dining with family (14% with family) than participants at McDonalds (41%; \(P<0.05\)). A greater proportion of purchasers of NPFF were dining with family (50%) than purchasers of traditional foods (26%; \(P<0.05\)).

Eleven per cent of respondents worked or trained in a health-related profession, with a similar proportion dining in at both stores (Table 1). Only 6% of respondents reported consuming foods or beverages not purchased from Subway or McDonalds. These were most commonly drinks and confectionery. Another 7% of respondents planned to purchase additional foods or drinks following their current meal. Only three of these respondents had also purchased NPFF.

Most respondents aged 16 years or older (98%, \(n\ 910/927\), Subway (S) = 483, McDonald’s (M) = 427) had purchased a main or a main as part of a meal deal (Table 2). Only 3% (\(n\ 24/910\)) of these respondents had purchased NPFF. When the relaxed criteria were used to classify purchasers of NPFF at Subway, 40% (\(n\ 193/483\)) of Subway diners and 25% of the entire sample (\(n\ 210/910\)) had purchased NPFF. Only one respondent aged <16 years had ordered NPFF using strict criteria (1%, \(n\ 1/98\), and seven had ordered NPFF using the relaxed criteria (7%, \(n\ 7/98\)).

Purchasers of NPFF were a median of 13 years older (age 38 (range 18–63) years) than purchasers of...
traditional foods (age 25 (range 16–84) years;  \( P < 0.05 \)) and 79\% were female (\( P < 0.05 \); Table 2). Purchasers of NPFF were less likely to dine alone (\( P < 0.05 \)) and more frequently reported having worked or trained in a health profession (29\%) than purchasers of traditional foods (11\%;  \( P < 0.05 \)). Significantly more purchasers of NPFF (46\% v. 18\%) cited health or nutritional content as a reason for their purchase (\( P = 0.002 \)). While more purchasers of NPFF at McDonalds (53\%) cited health or nutritional content as reasons for purchase than those purchasing traditional foods (5\%,  \( P = 0.000 \)), no differences were observed at Subway when the Subway strict criteria were applied (29\% v. 29\%,  \( P > 0.05 \)). However, more Subway purchasers of NPFF cited health or nutritional content as reasons for purchase when the relaxed criteria were applied (38\%) than purchasers of traditional foods (22\%) (\( P = 0.000 \)). The proportion of respondents who reported taste, convenience, cost or favourite food as reason for purchase was similar between groups (\( P > 0.05 \)).

Purchasers of NPFF ordered on average 1.5 fewer megajoules than purchasers of traditional foods (\( P < 0.05 \); Table 3). Purchasers of NPFF ordered lower-energy mains and complementary choices (1.5 MJ and 0.6 MJ, respectively)
not all demographics were completed by all respondents: health profession (n 889), no. of fellow diners (n 921), gender (n 927).
a,b,c,d,e,f,g Identical superscript letters within the same characteristic indicate significant differences between groups (P < 0.05).

### Table 2 Descriptive characteristics of purchasers of nutritionally promoted and traditional fast foods aged 16 years and older by total sample and store: lunchtime diners at Subway and McDonalds, Queensland, Australia

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Traditional total (n 886)</th>
<th>McDonalds traditional (n 410)</th>
<th>McDonalds NPFF (n 17)</th>
<th>Subway traditional (strict criteria) (n 476)</th>
<th>Subway NPFF (strict criteria) (n 7)</th>
<th>Subway traditional (relaxed criteria) (n 290)</th>
<th>Subway NPFF (relaxed criteria) (n 193)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of fellow diners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 (dining alone)</td>
<td>25.7%</td>
<td>4.2%</td>
<td>20.4%</td>
<td>0.0%</td>
<td></td>
<td>14.3%</td>
<td>25.5%</td>
</tr>
<tr>
<td>1</td>
<td>38.0%</td>
<td>54.2%</td>
<td>35.6%</td>
<td>47.1%</td>
<td></td>
<td>71.4%</td>
<td>48.7%</td>
</tr>
<tr>
<td>≥2</td>
<td>36.3%</td>
<td>41.7%</td>
<td>44.0%</td>
<td>52.9%</td>
<td></td>
<td>13.6%</td>
<td>26.7%</td>
</tr>
<tr>
<td>Purchased sides</td>
<td>48.2%</td>
<td>45.8%</td>
<td>80.5%</td>
<td>47.1%</td>
<td></td>
<td>42.9%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Purchased drinks</td>
<td>70.8%</td>
<td>79.2%</td>
<td>92.4%</td>
<td>76.5%</td>
<td></td>
<td>85.7%</td>
<td>50.8%</td>
</tr>
</tbody>
</table>

NPFF, nutritionally promoted fast food.
Not all demographics were completed by all respondents: health profession (n 882), no. of fellow diners (n 904), gender (n 910); only those who purchased mains were able to be classified as purchasers of nutritionally promoted or traditional fast foods (n 910).
a,b,c,d,e Identical superscript letters within the same characteristic indicate significant differences between groups (P < 0.05).
*Statistical analysis was not performed as the χ² test criterion of all cells having expected counts of >5 was not met.

than those purchasing traditional foods (2.5 MJ and 1.2 MJ, respectively; P < 0.05). While there were no differences in the proportion ordering sides in each group overall (Table 2), significantly fewer purchasers of NPFF ordered sides at McDonalds. Purchasers of NPFF also ordered sides containing 0-4 fewer megajoules than purchasers of traditional foods (P < 0.05; Table 3). Further only 30% ordered a side of fries compared with 80% of purchasers of traditional foods at McDonalds (P < 0.05).

Average energy content of drinks purchased and the proportion purchasing drinks were similar between groups overall (Tables 2 and 3). However, more purchasers of NPFF at McDonalds did not order a drink (23%) than purchasers of traditional foods (8%; P < 0.05). This may have resulted in purchasers of NPFF at McDonalds ordering fewer megajoules from drinks (0-3 MJ) than purchasers of traditional foods (0-6 MJ, P < 0.05).

Purchasers of NPFF ordered more (0-6 servings, ~45 g) vegetables than purchasers of traditional foods (P < 0.05; Table 3). Purchasers of NPFF at McDonalds ordered foods containing one more vegetable serving (75 g) than purchasers of traditional foods. The vegetable content of lunches did not differ between purchasers of nutritionally promoted or traditional fast foods at Subway when both the strict and relaxed criteria were applied. However, Subway diners ordered more vegetable servings (1-4 (range 0-4-4)) than McDonalds’ diners (0-2 (range 0-1-4); P = 0.000).

### Discussion

Fewer than three NPFF were purchased for every 100 traditional mains purchased. No previous studies have independently investigated NPFF purchase rates; however, our purchase rates appear lower than company and media reports. An Australian newspaper reported in 2008 that approximately 15% of sales at McDonalds were from NPFF(14). The National Heart Foundation(15) reported in 2007, the year McDonalds introduced its nutritionally promoted meals in Australia, that 19% of McDonalds’ customers reported changing their order from a traditional to a nutritionally promoted meal. Also, another 29% of customers intended to purchase the nutritionally...
Table 3. Energy and vegetable contents of nutritionally promoted and traditional fast foods purchased by those aged 18 years and older by total sample and store; lunchtime diners at Subway and McDonald's, Queensland, Australia

<table>
<thead>
<tr>
<th></th>
<th>Subway traditional (strict criteria) (n= 290)</th>
<th>Subway NPFF (relaxed criteria) (n= 17)</th>
<th>McDonald's NPFF (n= 410)</th>
<th>McDonald's traditional (n= 177)</th>
<th>Subway NPFF (strict criteria) (n= 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total energy (MJ)</td>
<td>28.4 ± 2.9</td>
<td>12.9 ± 1.7</td>
<td>26.5 ± 2.0</td>
<td>26.0 ± 1.9</td>
<td>26.9 ± 2.2</td>
</tr>
<tr>
<td>Mains (MJ)</td>
<td>14.8 ± 1.7</td>
<td>6.3 ± 1.0</td>
<td>13.4 ± 1.7</td>
<td>13.6 ± 1.2</td>
<td>14.2 ± 1.7</td>
</tr>
<tr>
<td>Comp choices (MJ)</td>
<td>4.0 ± 0.5</td>
<td>1.4 ± 0.5</td>
<td>4.1 ± 0.6</td>
<td>4.0 ± 0.5</td>
<td>4.1 ± 0.5</td>
</tr>
<tr>
<td>Sides (MJ)</td>
<td>2.9 ± 0.8</td>
<td>1.0 ± 0.4</td>
<td>3.1 ± 0.8</td>
<td>3.1 ± 0.6</td>
<td>3.3 ± 0.8</td>
</tr>
<tr>
<td>Drinks (MJ)</td>
<td>0.6 ± 0.4</td>
<td>0.1 ± 0.1</td>
<td>0.7 ± 0.5</td>
<td>0.7 ± 0.5</td>
<td>0.7 ± 0.5</td>
</tr>
<tr>
<td>Vegetable servings*</td>
<td>0.4 ± 0.4</td>
<td>0.1 ± 0.0</td>
<td>0.4 ± 0.0</td>
<td>0.4 ± 0.0</td>
<td>0.3 ± 0.0</td>
</tr>
<tr>
<td><strong>Promotion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Comp, complementary; NPFF, nutritionally promoted fast food. Only those who purchased mains were able to be classified as purchasers of nutritionally promoted or traditional fast foods (n= 910). Comp choices are not displayed in NPFF purchase rates. Identical superscript letters within the same characteristic indicate significant differences between groups (P<0.05).

Purchasers of NPFF were more likely to be older, female, trained in a health profession, dining with others and to cite health or nutritional content as reasons for purchasing their lunches when compared with those who made traditional purchases. Rydell et al.\(^\text{13}\) found that those aged 15–24 years were less likely to choose fast-food options they considered nutritious compared with those aged 55 years or older. Women have previously been more likely to self-report choosing fast-food options that they considered to be healthier\(^\text{17}\), and may eat fast foods because of family and/or friends like it\(^\text{19}\). The demographic differences found in the present study were not always significant within each chain. This may be due to the small sample of purchasers of NPFF (M: n 17; S: n 7).

Purchasers of NPFF displayed similar characteristics to those who consumed fast foods less frequently. The median age of purchasers of NPFF in our sample was 38 (range 18–63) years. Those aged 35–45 years and above have previously been observed to consume fast food less frequently\(^\text{20,21}\). Purchasers of NPFF were predominantly female and some studies have reported males consume fast foods more frequently than females\(^\text{17,18,21,33}\). Purchasers of NPFF in our sample more often reported working or training in a health-related field, and Mohr et al.\(^\text{20}\) found that individuals with a greater knowledge of the diet–disease relationship consume fast foods less frequently. If purchasers of NPFF represent a group who consume fast foods less frequently, this would explain why purchase rates were low.

Purchasers of NPFF ordered lunches containing on average 1-5 fewer megajoules than purchasers of traditional fast foods. The only previous study to investigate energy differences between nutritionally promoted and traditional fast foods did not explore purchasing patterns but found that NPFF available on fast-food menus contained 2MJ less than traditional meal options that were also available\(^\text{2}\). Our study showed that a significant reduction in lunchtime energy content occurs when NPFF are purchased.
A health halo effect was not evident during the lunchtime purchase of NPFF. Purchasers of NPFF ordered lunches with fewer megajoules and a similar number of sides and drinks as purchasers of traditional foods, with fewer purchasers of NPFF ordering sides and drinks at McDonalds. Chandon and Wansink\(^{23}\) reported that fast-food consumers who perceived that they were ordering a healthier option were more likely to order sides and complementary choices resulting in orders with higher total energy. However, these results were based on a small university sample \((n<50)\) in a simulated purchase situation\(^{23}\). Although no health halo effect was evident at lunchtime in our study, a health halo effect may occur over a longer time period, for example an entire day. Further research is needed to determine whether a nutritionally promoted lunch purchase leads to an overall reduction in daily energy intake.

Purchasers of NPFF ordered 0-6 more vegetable servings than purchasers of traditional foods, primarily due to the inclusion of more vegetables within the nutritionally promoted mains at McDonalds. Subway diners also purchased significantly more vegetables than McDonalds’ diners. Providing the option to include vegetables in every fast-food main sold may result in increased vegetable purchases. This may be a useful strategy as those who consume fast foods more frequently tend to have lower vegetable intakes than irregular fast-food consumers\(^{3,21,54}\).

The present study has several strengths. Data were collected from respondents after the point of purchase, which likely reduced any influence the study may have had on respondents’ purchasing behaviour. Data collected just after purchase also eliminated recall bias and reflects actual behaviours, whereas investigations of purchase intentions may not\(^{15,25}\). Data collected immediately after the point of purchase also enabled researchers to clarify responses and cross-check responses against observed purchases, thus improving the validity of the instrument. Further, the store acceptance and respondent response rates were high (81% and 73%, respectively).

The study collected data on foods and drinks purchased. While respondents were instructed prior to survey completion to report only foods purchased for their own consumption, reported purchases may not accurately reflect consumption. Males may be more likely to consume a larger percentage of fast foods purchased than females\(^{17}\) and therefore purchasers of NPFF, who were predominantly female, may consume less of their purchases. The difference in lunchtime energy content between purchasers of traditional and NPFF observed in our study may therefore be conservative in terms of consumption. Underestimation of lunchtime energy intake was unlikely to occur as a result of additional purchases though, as only 6% of respondents reported consuming foods or drinks in addition to those purchased from Subway or McDonalds, and only 7% reported planning to purchase further items at lunchtime. Additionally, only three respondents who had reported planned or additional purchases had also purchased NPFF.

Another limitation of the present study was that only dine-in customers were surveyed and their purchases may not represent all fast-food purchasers. Mohr observed that eat-in diners were more likely to be under 45 years of age and unconcerned about health, which could in part explain our low purchase rates of NPFF\(^{20}\). However, a New York study that collected purchase receipts from dine-in and take-away fast-food customers reported average energy intakes \((S=3.1 MJ; M=5.5 MJ)^{24}\) that were comparable to the majority of respondents in our study \((S=3.5 MJ; M=4.0 MJ)\). While more than half \((56\%, 30/54)\) of the standalone stores in the Gold Coast region were visited, the survey was administered only at Gold Coast and Brisbane locations and stores were not randomly selected. This may limit the generalizability of findings to the wider population, particularly given the high proportion of university students sampled for Subway. However regular fast-food consumers are often younger\(^{20}\), and university students therefore fit this demographic. Further research on fast-food purchasing patterns in rural areas may also be warranted. Another study limitation was that the majority of the nutrient information was sourced directly from fast-food companies’ websites. As independent sources were not used, this reduces confidence in the accuracy of the nutrient information. The impact of fellow diners on food purchasing behaviour was also not investigated. Family members may impact upon purchasing behaviours as families may be more likely to purchase similar foods. However the impact of family presence may be reduced because respondents aged <16 years, a group who may be more likely to visit fast-food restaurants with family, were excluded from the analysis.

Overall, the purchase rate of NPFF observed in the present study was low but, when purchased, led to reductions in energy and improvements in vegetable content at lunchtime compared with those who made traditional purchases. Those who purchased NPFF shared similar demographics to irregular fast-food consumers, a potential explanation for the low purchase rates of these foods. To further elucidate purchasing behaviours displayed by those who choose NPFF, future studies could measure purchase rates of NPFF at other meal times and in the wider population, examine how to improve the purchase rates of NPFF among regular fast-food consumers, investigate whether NPFF purchases translate to a decrease in total daily energy intake, and confirm whether vegetable intakes improve among fast-food consumers if included as an option or in larger quantities in every main meal choice.

**Acknowledgements**

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sector. The authors have no conflicts of interest. Both authors were
References

22. Douglas J (2009) Top of the Food Chain McDonald’s Australia has led the way for the global fast-food chain’s evolution from pariah to purveyor of healthy goods – although some are still to be convinced. Bus Rev Wkh 30, issue 13, 28–29.