Original research

Breakfast consumption patterns of upper primary school students in 14 Queensland schools

Barbara C. Radcliffe, Chris Ogden, Terry Coyne and Pippa Craig

Abstract

Objective: To describe the settings for, and foods eaten at, breakfast for a sample of Queensland school children.

Design: A cross-sectional study using a 17-item, self-completed questionnaire, and recall of all foods and beverages consumed for breakfast on the day of the survey.

Subjects: Eight hundred and thirty-two upper primary school students (11 to 12 years of age).

Setting: Fourteen schools from urban and rural locations in southern Queensland.

Main outcome measures:

- Foods and beverages reported consumed for breakfast.
- The percentage of children who reported consuming energy-dense, micronutrient-poor food or beverage choices.
- Location of breakfast consumption.
- Persons preparing breakfast.
- Foods purchased on the way to school.
- Classification of foods purchased according to the Australian Guide to Healthy Eating food groups.

Statistical analyses: Frequencies of responses and cross tabulations using SPSS version 11.0.

Results: Useable responses were obtained from 828 (99.5%) students. The most common breakfast item reported was breakfast cereal (55%). A third of children reported consuming a breakfast containing items from three or more food groups from the Australian Guide to Healthy Eating, while 22% of children consumed energy-dense, micronutrient-poor foods or beverages. Food was reported to have been purchased on the way to school in the week prior to the survey by 20% of children.

Conclusion: The quality of breakfast food choices needs to be addressed, especially the intake of energy-dense, micronutrient-poor food items and the frequency and types of foods purchased on the way to school. Strategies that include parents, children, the school and community settings are recommended.

Key words: breakfast, school, nutrition, children, food groups
Introduction

The consumption of breakfast has been associated with many benefits for children, such as its positive effects on daily nutritional intake (1–5), body weight (1,6,7) and lipid profile (1). Ruxton and Kirk’s review paper concluded that, ‘Breakfast consumption is a marker for an appropriate dietary pattern in terms of macro and micro-nutrients, particularly if breakfast cereals are included in the meal’ (1).

It is logical that these stated benefits are only achieved if healthy breakfast food choices are made. However, little research has been published on the types of foods and beverages consumed by Australian children for breakfast.

Therefore the Queensland School Breakfast Project (QSBP) was conceived, and funding was received from the Australian Government Department of Health and Ageing (under the National Child Nutrition Program) to address the prevalence and quality of breakfast consumption among upper primary school children. The aim of this study was to describe the foods self-reported consumed for breakfast by students participating in the QSBP on the day of the baseline survey and to categorise these foods using the Australian Guide to Healthy Eating (AGHE). The breakfast settings and the purchase of food on the way to school over the week prior to the survey were also recorded.

Methods

Focus group data (unpublished) from the present study indicated that children of the age group surveyed had a tight definition of breakfast that related to the type of food and location of its consumption rather than its timing. For this reason, breakfast was defined as any food or beverage (except water) taken during the period between waking and the commencement of morning school classes (approximately 9.00am). Foods eaten outside the home (e.g. on the way to school) and non-traditional breakfast items such as leftovers, crisps or confectionery were often not perceived to be ‘breakfast’. This survey thus included all food items supplied at home, on the way to school, as well as those supplied by schools through breakfast programs or any other means.

Focus groups and the development of the questionnaire

In 2001, QSBP staff carried out thirty-five focus groups in urban, rural and remote school communities within southern Queensland to elicit information about knowledge, attitudes, beliefs and perceived barriers to breakfast consumption. A total of 226 students were chosen from grades five (n = 90), seven (n = 94) and eight (n = 42). Separate focus groups were held for boys (n = 107) and girls (n = 119) for each grade to explore specific gender issues and those relating to age. Informed consent was gained from parents of children participating in the focus groups.

Based on information gleaned from the focus groups, a 17-item questionnaire was developed. The majority of questions were multiple choice and the questionnaire required approximately 12 minutes to complete. The questionnaire was piloted in three schools to ensure readability, comprehension and to calculate the time required for completion. Minor changes were made in response to this pilot.

Selection of schools

All primary public, Catholic and independent schools in southern Queensland were invited to participate (n = 651) in the project through a letter to the school principal. An invitation was also published in Education Queensland’s newsletter, Education Views. Those schools that responded were provided with additional information and asked to complete an expression of interest. A total of 14 schools correctly completed this process and all were recruited to the project. Of the 14 schools, there were 13 state primary schools and one independent school for girls. Data were collected from 832 students. Four surveys were excluded because information on gender was not provided. Education Queensland reviewed the written survey and provided a letter of support to be distributed to recruited schools. All school principals decided that no parental consent was required for conducting the survey because responses were anonymous and only composite data were to be published.

Data collection

The questionnaires were completed by students of all grade seven and composite grade six/seven classes (11 to 12 years old) in a morning class under the supervision of the class teacher. Children who completed the survey were not informed prior to the event that this activity would take place so that this would not change their breakfast intake on the day of the survey. Students completed the baseline surveys during term one of the school year (February to April 2002).

Much of this paper focuses on the responses to the first question of the survey; ‘What did you eat and drink today between the time you woke up and when you started class?’. Separate columns for food and beverages were provided for students to record their responses. There was no attempt to ask students to quantify serve sizes due to uncertainty regarding students’ ability to estimate these without professional assistance. Responses to additional questions relating to who prepared breakfast, where breakfast was eaten, the usual number of days per school week that breakfast was eaten, foods purchased on the way to school during the previous week, and the venue where food was purchased were also assessed. Questions concerning breakfast food preferences, reasons for eating or skipping breakfast and attitudes related to the association of breakfast with health and performance were also considered in this paper in relation to the food consumed. In the very few instances where writing was illegible, best guesses were made and cross-checked by other project staff.

Assessment of breakfast quality

The quality of individual breakfasts was assessed by means of the number of the five food groups in the AGHE. Table 4 describes the scoring system adopted for the Food Group Score (FGS). The FGS ranged from one (no food or beverage) to a maximum score of five if breakfast reported foods from three of more AGHE food groups. For the FGS, if ‘extra foods’ were reported as well as foods from the five AGHE food groups, the ‘extra
foods’ were ignored and the score related to the five foods only. For example, if a child reported having a soft drink with cereal, toast and banana, only the cereal, toast and banana were included in the score. Mixed foods were considered on the basis of their usual ingredients, for example, reported cereal was scored as a cereal and milk choice (two food groups). Table 5 lists the AGHE food groups used to calculate the FGS.

Certain breakfast foods were categorised as ‘energy-dense, micronutrient-poor’ (EDMP) food choices. The World Health Organization uses this term to describe items that ‘tend to be processed foods that are high in fat and/or sugar’ (8). To determine the proportion of children consuming EDMP food choices for breakfast, the ‘extra foods’ group from the AGHE was used. ‘Extra foods’ are classified as ‘not essential to provide the nutrients the body needs and some contain too much fat, salt, and sugar. These foods are likely to contribute large amounts of energy. Examples include biscuits, cakes, desserts, pastries, soft drinks, high fat snack items, such as crisps, pies, pastries, sausage rolls and other takeaways, lollies and chocolate’ (9). Table 3 includes all of the foods reported in the survey in EDMP categories. Legumes appear in two food groups in the AGHE (9). For this study, legumes were counted in whatever group had not already been represented in the breakfast concerned. Consistent with the AGHE, high fat takeaways based on processed meat such as frankfurts, kabana and salami were placed in both the ‘meat, fish, poultry, eggs, nuts and legumes’ group and the ‘extra foods’ groups. This acknowledged their micronutrient contribution as well as their status as high fat foods. Some unclassified foods such as yeast and meat spreads were not included in any food group. Several variables were dichotomised such as EDMP (consumption of none or any) and food group score (low score 1–3; high score > 3). Cross tabulations were then performed with none or any) and food group score (low score 1–3; high score > 3). Cross tabulations were then performed with other variables such as the intake of specific items, and positive or negative responses to various questions on the breakfast setting and individual beliefs regarding the perceived benefits of breakfast were determined.

Frequencies of responses and cross tabulations were calculated using SPSS (SPSS Inc, New Jersey, Prentice Hall; version 11.0 2001). Two-tailed chi square analyses with a level of significance (P < 0.05) are reported. The frequencies of the most commonly reported food and beverage items were collated from the foods eaten on the day of the survey. These included breakfast cereals (further separated into high fibre and low fibre choices), toast, fruit, milk, flavoured milk, and fruit juice. Definitions of foods and beverages (animal types) used in this paper are given in Table 3.

**Results**

Equal number of girls (n = 414) and boys (n = 414) completed surveys. Tables 1 and 2 describe the sample population by location using the Rural, Remote and Metropolitan Areas Classification (RRMA) (10), the Accessibility/Remoteness Index of Australia (ARIA) (11) and by socio-economic status using the Socio-economic Indexes for Areas (SEIFA). There was no significant difference between the proportion of children attending schools in metropolitan and non-metropolitan areas compared to the Queensland population for this age group (11 to 12 years). However, the sample population had a higher proportion of children attending schools in remote areas and a lower proportion for rural areas compared to the state for the same age group. For ARIA, the proportion of children attending schools in highly accessible and accessible areas compared to less accessible locations was not significantly different from state figures. Schools from each SEIFA classification were included in the sample, with a greater proportion of the sample population from the highest and lowest SEIFA categories compared to state figures. However, there was no significant difference between the proportions of children attending schools in most advantaged areas (SEIFA 1–2) and those from more disadvantaged areas (SEIFA 3–5) in the sample compared to state figures for this age group.

High response rates were achieved for all questions and were maintained to the end of the questionnaire, with 98% of students providing responses to the final question. The reported number of foods items eaten at breakfast on the day of the survey varied greatly, with 3% of children having no food, some children having very little (e.g. ‘one quarter of a plum’), while other children reported a large number of foods (e.g. “strawberry jam toast, egg, corn flakes, hot cross bun, lolly, jam tart, water, milk, ‘Coke’, ‘Vitafresh’ fruit juice”).

<table>
<thead>
<tr>
<th>Table 1. Scoring for Food Group Score for breakfasts eaten</th>
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<tbody>
<tr>
<td><strong>Score</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

(a) Australian Guide to Healthy Eating (AGHE) (9).
As shown in Figure 1, the most common breakfast items reported on the day of the survey by gender were quickly and easily prepared breakfasts such as commercial breakfast cereals and toast. Plain milk as a beverage was reported as consumed by 35% of students, 17% reported drinking flavoured milk, milk shakes or smoothies, while 4% reported both milk and flavored milk. Water was reported as consumed by 46% of students.

Of those who reported eating cereal, 49% reported a high fibre cereal, 48% reported a low fibre cereal, while 2% had a mixture of low and high fibre choices (data not shown). There was no association between reported intake of cereal and reported consumption of any EDMP choices.

Twenty-two percent of children reported consuming at least one EDMP choice for breakfast on the day of the survey. Five percent of children reported eating confectionery on the day of the survey, 4% chips, crisps or high fat savoury snacks, 3% sweet biscuits, cookies or muesli bars and 4% reported consuming high fat savoury items. For beverages, 5.3% reported consuming cordial and 3.5% soft drink. There was no significant difference in the intake of EDMP choices between girls and boys. The intake of any EDMP was significantly higher ($P = 0.029$) for children of schools located in remote areas (29.9%) compared to metropolitan (20.1%) and rural (22.4%) areas combined using the RRMA classification (10). Schools located in high socioeconomic status areas (SEIFA = 1–2) had the lowest proportion of children reporting the intake of any EDMP (17.7%), compared to 28.2% for moderate status (SEIFA = 3) and to 21.3% for lower socioeconomic status (SEIFA = 4–5). The difference between schools from high and moderate socioeconomic status for the consumption of any EDMP was significant ($P = 0.01$). Tea or coffee consumption was reported by 5% of children.

Approximately one third of students ate a breakfast that included items from at least three AGHE food groups (9) and 4% of children reported no foods from any AGHE food groups. Figure 2 depicts the proportion of children by FGS.

Higher FGS (> 3) were associated with reporting a liking for breakfast ($P = 0.005$) or a family routine that included breakfast ($P < 0.001$). Those children reporting positive attitudes towards breakfast were significantly more likely to have a higher Food Group Score (> 3) than those without such attitudes. These attitudes were assessed by agreement with separate statements of beliefs regarding the impact of breakfast on body weight ($P = 0.38$), sporting performance ($P = 0.001$), energy for

![Figure 1. Most common breakfast items consumed as a beverage (girls: n = 414, boys: n = 414)](image-url)
There was no association between reporting a high FGS (> 3), socio-economic status or location of school and the intake of any EDMP items.

### Food purchased on the way to school

The purchase of food on the way to school in the week prior to the survey was reported by 20% of children. This figure varied greatly between schools (9%–38%). The majority of items purchased by students were EDMP items, in particular confectionery and soft drinks (Figure 3). The corner shop was the most common venue to purchase these items (Figure 4). The reported purchase of food or beverage items on the way to school on the week prior to the survey was significantly related to the intake of EDMP on the day of the survey, with 39.3% of food purchasers reporting one or more EDMP choices compared to 18.2% of those who did not report purchasing items ($P < 0.001$). Socioeconomic status was not associated with differences in the proportion of children reporting that they purchased food on the week prior to the survey.

There was no association between reported high FGS (> 3) and whether food was purchased on the way to school. There was a positive association between reported usual skipping of breakfast on one or more school days per week and the purchase of food on the way to school, with 15.9% of non-skippers compared to 23.1% of breakfast skippers reporting purchase of foods on the week prior to the survey ($P = 0.025$).

### Table 3. Definitions of food categories used

<table>
<thead>
<tr>
<th>Category of food/beverage</th>
<th>Items included or excluded from category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Most common breakfast items</strong></td>
<td></td>
</tr>
<tr>
<td>Breakfast cereals:</td>
<td>All, including porridge</td>
</tr>
<tr>
<td>high fibre</td>
<td>&gt; 3 g fibre/45 g serve</td>
</tr>
<tr>
<td>low fibre</td>
<td>&lt; 3 g fibre/45 g serve</td>
</tr>
<tr>
<td>Toast</td>
<td>Toast, raisin toast, English muffins</td>
</tr>
<tr>
<td>Fruit</td>
<td>Fresh, dried, canned (fruit incorporated in ready-to-eat breakfast cereals or bread or muffins was not included)</td>
</tr>
<tr>
<td>Milk</td>
<td>Plain milk of any fat content or animal source consumed as a beverage</td>
</tr>
<tr>
<td>Flavoured milk</td>
<td>All flavoured milks, smoothies</td>
</tr>
<tr>
<td>Tea or coffee</td>
<td>All brands and types</td>
</tr>
<tr>
<td>Water</td>
<td>All forms</td>
</tr>
<tr>
<td><strong>EDMP(a) foods/beverages</strong></td>
<td></td>
</tr>
<tr>
<td>Chips</td>
<td>Hot chips, hash browns, crisps, corn chips, other extruded snacks</td>
</tr>
<tr>
<td>Confectionery</td>
<td>Lollies, chocolates</td>
</tr>
<tr>
<td>Sweet biscuits/cakes</td>
<td>Sweet biscuits, cakes, cake-based muffins, muesli bars, breakfast bars, and toasted breakfast tarts</td>
</tr>
<tr>
<td>High fat savoury items</td>
<td>Crumbed fried chicken, sausage roll, meat pies, sausages, frankfurts, kabana, salami, fish fingers, chicken nuggets, pizza, savoury croissants</td>
</tr>
<tr>
<td>Soft drink</td>
<td>All non-diet soft drinks and sports drinks</td>
</tr>
<tr>
<td>Cordial</td>
<td>All non-diet brands and types</td>
</tr>
</tbody>
</table>

(a) Energy-dense micronutrient-poor foods (13).

For those who reported eating breakfast ($n = 800$), the vast majority of children (74%) prepared their own on the day of the survey, a parent or other adult prepared breakfast for 23% of students, while 3% of students had breakfast prepared by a sibling or other non-adult. Neither the intake of any EDMP choice nor the FGS (high vs low) was significantly associated with who prepared breakfast. Of those who reported that they regularly ate breakfast, 96% reported that they ate it at home on most school days ($n = 797$).

![Figure 2. Percentage of subjects in each of the Food Group Score (FGS) categories ($n = 828$)](image-url)
adults and 10-year-olds (13). The addition of milk to breakfast cereals is a contributing factor to reported associations between breakfast cereals and nutrient intakes, particularly calcium and vitamin A (7). The consumption of milk at breakfast by almost half the children in this study contributed to calcium intake, whether milk was consumed with breakfast cereals or as a beverage (either plain or flavoured).

The finding that consuming breakfast cereal or a breakfast with a high Food Group Score was not protective against the intake of EDMP items is important in relation to proposed interventions. Different strategies may be required to increase the intake of better quality breakfast items and to minimise EDMP selection.

Our study found that 22% of children reported choosing one or more EDMP items for breakfast on the day of the survey. These choices may have a significant influence on total energy intake and consequently the risk of developing childhood obesity. This is consistent with American findings for adults where increasing intake of energy dense, nutrient poor foods was positively related to total energy intake, and percentage energy from fat, and negatively associated with compliance with nutrient- and food group-related dietary guidance (14). Australian rates of overweight and obesity for 7- to 11-year-olds are 23.5% for females and 15.3% for males (15). The purchase of food on the way to school on the week prior to the survey was related to EDMP choice. However, it is unclear whether the EDMP items reported on the day of the survey were provided at home for breakfast or in lunchboxes or purchased on the way to school.

This study highlights the importance of the home environment, with 96% of those who reported regularly eating breakfast consuming it at home. Although the vast majority of children prepared their own breakfast, parents still play an important role in the development of children’s food preferences through modelling of food selection and

Discussion

Although 97% of children consumed some food or beverage, the number of breakfast items eaten on the day of the survey varied greatly between students. This is an important factor when considering potential strategies for improving breakfast consumption so that both under-consumption and over-consumption of food at breakfast time are addressed.

Our survey found just over half of the children surveyed consumed ready-to-eat breakfast cereals, consistent with the 1995 National Nutrition Survey (12) in which 59% of eight- to 11-year-olds, and 62% of 12- to 15-year-olds reported eating breakfast cereals (not including porridge) sometime during the day of the survey. In Northern Ireland, where the majority of breakfast cereals were fortified with a range of vitamins and iron on a voluntary basis, ready-to-eat breakfast cereals were reported to be associated with higher daily intakes of most micro-nutrients and with a macro-nutrient profile consistent with current nutritional recommendations for both young

Table 4. Demographic information of survey schools using Rural, Remote and Metropolitan Areas (RRMA) Classification and compared to the Queensland population

<table>
<thead>
<tr>
<th>School type</th>
<th>Number of children surveyed</th>
<th>% of sample</th>
<th>% of Queensland population 11–12 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan centre</td>
<td>492</td>
<td>59.4</td>
<td>57.1</td>
</tr>
<tr>
<td>Rural centre</td>
<td>94</td>
<td>11.4</td>
<td>19.8</td>
</tr>
<tr>
<td>Other rural area</td>
<td>125</td>
<td>15.1</td>
<td>17.0</td>
</tr>
<tr>
<td>Remote centre</td>
<td>83</td>
<td>10.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Other remote area</td>
<td>34</td>
<td>4.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>828</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

(a) Number of schools in brackets.

Figure 3. Proportion of students reporting purchase of various items on the way to school (only those students purchasing items during the previous week included, i.e. n = 145)

Figure 4. Outlets where food items were purchased (n = 145)

(a) Non-EDMP food items.

Table 5. Percentage of sample by Socio-Economic Indexes for Areas (SEIFA)\(^{10}\) and Accessibility/Remoteness Index of Australia (ARIA)\(^{11}\) compared to Queensland data

<table>
<thead>
<tr>
<th>SEIFA</th>
<th>ARIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey population based on school postcode</td>
<td>1 2 3 4 5 1–2 3–5</td>
</tr>
<tr>
<td>Queensland children (aged 11–12 years)</td>
<td>12.7 20.0 19.5 28.1 19.7 84.2 15.8</td>
</tr>
</tbody>
</table>

(a) SEIFA is measured from least disadvantaged (1) to most disadvantaged (5).
(b) ARIA rate locations by their accessibility to services. Categories include: highly accessible (1), accessible (2), moderately accessible (3), remote (4) and very remote (5).

...have successfully used the recall method for cross sectional analysis of the intake of this population (17). In the 1995 National Nutrition Survey, children from 5- to 11-years old were asked to provide their own food intake data with the assistance of an adult household member (18). No assistance was provided for our survey which was completed within school hours. This was advantageous as parental assistance may have reduced the quality of the data provided by influencing children to under-report food items that children perceived would not meet the approval of their parents/guardians, such as those purchased on the way to school. It is also unlikely that adult assistance would have improved the accuracy of the data provided for foods eaten at home because the vast majority of children surveyed prepared their own breakfast.

Conclusions

This survey found only 3% of children did not eat breakfast on the day of the survey and only 4% consumed it in a venue other than home. Due to the low numbers in this target group, it is unlikely that breakfast programs would be feasible in the schools studied unless a significant shift from eating breakfast at home is promoted. The ethics and potentially negative social consequences of promoting such a shift needs to be considered by each school when contemplating the establishment of breakfast services. The findings also stress the need to determine breakfast skipping rates within individual schools before committing valuable resources to breakfast programs.

Improving the quality of breakfast consumed should be a priority. Rather than relying solely on breakfast programs at school, new strategies that involve parents, schools and other players should be developed so that children have access to a variety of healthy, interesting and acceptable food choices for breakfast.

Upper primary school is a time when the vast majority of children are developing autonomy, especially regarding the choice and preparation of food at breakfast. However, parents and guardians need to understand the importance of breakfast to the overall nutritional intake of their children. Strategies for promoting healthy choices may involve displaying positive attitudes towards breakfast, modelling breakfast eating behaviours, including breakfast as an enjoyable and regular part of the family routine, and purchasing wisely to make healthy choices available.

The school setting, through curriculum and other social marketing activities, can also contribute to the knowledge, attitudes and skills of children in selecting and preparing breakfast. Approximately 17% of schools tuckshops in Queensland provide breakfast (19). Such services may be of particular benefit for children where travel time to school is significant, where students participate in early morning extra curricular activities, and for children who are not hungry first thing in the morning.

Schools may also be instrumental in developing strategies with the wider community to reduce the purchase of EDMP choices on the way to school. This may include strategies that support local food vendors to sell and promote healthy breakfast choices for school children.

Further research on the effect of socioeconomic status and the quality of breakfast eaten would be useful. Additional data on where breakfast items are sourced by...
Children (e.g. home, lunchbox, school, local shops) would also provide useful information for future interventions to improve the quality of breakfast eaten by upper primary school children.

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