PROJECT TITLE

Lunchbox contents of newly arrived refugee school children: how do they compare nutritionally to those of other children?

A project conducted on behalf of NSW Refugee Health Service under the supervision of Mrs. Faye Southcombe, Community Dietitian.

Submitted by:

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Abstract

Objective: Given the rise in obesity prevalence and the paucity of data regarding refugee children’s eating patterns, the objective of this study was to identify the main foods and beverages consumed in primary school by children of refugee and non-refugee background and to compare their consumption patterns.

Design: Cross-sectional survey of school foods and beverages consumed by 76 children aged 5-12 years using the School Food Checklist, a calibrated and validated tool, September-October 2008.

Setting: Two primary schools with a high representation of refugee children in the Fairfield Local Government Area in NSW, Australia.

Results: School food consumption was similar among children from refugee and non-refugee backgrounds. Nearly all children brought foods from home (95%). The lunchbox foods most frequently consumed were bread (67.1%), packaged snacks (56.6%), fruit juice/cordial (50%), fruit (38.2%) meat/seafood/egg filling (36.8%), biscuits/crackers (28.9%), chocolate/lollies (22.4%) and sweet spreads (20.5%). ‘Extra foods’ was the largest contributor to the energy intake of children at school in this study (61%) while bread provided 25% of total energy, fruit juice/cordial 9.1% and fruit 7.3%. In all, 90% of children had ‘extra foods’ in their lunchboxes.

Conclusions: There is an overrepresentation of less healthy foods in the lunchboxes of school children. Interventions aimed at promoting healthy eating in school children should also target the home preparation of lunchboxes and acknowledge nutrition issues experienced by refugee communities.

Keywords: Australia; child; energy intake; food habits; lunchbox; nutrition; refugees; school health.
Introduction

There is a growing body of evidence to suggest that refugees in Australia are nutritionally compromised upon arrival. Annually, Australia accepts approximately 13,000 refugees through the Department of Immigration and Citizenship’s (DIAC) Humanitarian Program(1). In 2006-2007, 51 percent of refugees came from Africa, 28 percent from the Middle East and South West Asia, and 21 percent from Asia(1). In coming years, it is planned that humanitarian intake priorities will move towards an even allocation amongst the Middle East, Asian and African regions(1). Approximately 40 percent of all new arrivals are children and youth(2).

In addition, many migrants arriving in Australia under the Family Migration program originate from countries from which Australia concurrently accepts refugees. Although not arriving as refugees, these people have endured similar situations prior to arrival(3). Such situations include experiencing traumatic conditions of persecution, social disruption, dislocation, loss and grief, famine, war, overcrowding, poor nutrition or health(4). These experiences can have a profound impact on the cognitive, emotional, social and physical health of refugees and their children(5, 6).

On arrival, refugees often present with nutrition-related problems(7-9). A coexistence of undernutrition and overweight/obesity has been reported in migrant and refugee children, with obesity becoming more prevalent with increased length of stay in Australia(9). Refugees may face many challenges adapting to a new food system, and may have inadequate knowledge about nutrition that can affect their dietary choices(10, 11). Furthermore, a high prevalence of food insecurity has been reported among various refugees communities across Australia(12-14). Food insecurity is linked to increased levels of overweight and obesity, low intakes of micronutrients, fibre, fruit and vegetables(15-17), and may further compromise the nutritional status of refugees(12-14).

The adoption by migrants of the dietary practices of their host country is a process referred to as “dietary acculturation” (18). There are several factors that can influence dietary acculturation including familiarity with food, cultural food beliefs including perceptions of Western foods, media influences, level of education and economic constraints(11). The process of acculturation is important to the health sector. Previous research suggests that the health of refugees migrating to Australia generally declines with increased length of stay, until it is similar to that of the Australian-born population(10, 19, 20). It has recently been reported that the maintenance of traditional cultural orientation is associated with lower rates of obesity(21). Therefore, maintaining a traditional diet can be important given the increased obesity risk observed with rapid dietary acculturation(10, 22).

Childhood obesity has become a major public health concern for all Australian children(23, 24). According to the latest National Health Survey (NHS)
conducted in 1995, over 20% of children aged 7-15 years are either overweight or obese, with the prevalence of childhood overweight and obesity more than doubling from 1985 to 1995(24). Childhood obesity has important psycho-social and health consequences that can persist into adult life(25, 26). It is foreseeable that an increasing number of obese children growing into obese adults will place an increased economic and health burden on society(27, 28).

In an effort to identify some of the underlying factors relating to childhood obesity, many studies have investigated the eating patterns of children(29-31). The school environment has been acknowledged as an important setting for monitoring children's food and beverage consumption, and for delivering prevention programs(32, 33). Interventions targeting canteens, lunchboxes brought from home, and the broader school environment are growing in an attempt to address some aspects of the ‘obesogenic’ school environment(32, 34-36).

Based on an analysis of the 1995 National Nutrition Survey (NNS), it has been reported that 5 to 15 year old Australian children consume over a third of their daily energy intake at schools, which includes a high proportion of energy-dense snacks and beverages(37). Few studies have examined the actual lunchbox contents of school children(38), although it appears that most Australian children (86%) take their lunchboxes to school(37). A recent study conducted among 1,681 primary school children in Victoria showed that as much as 90% of children had energy dense low micronutrient ‘junk foods’ in their lunchboxes(38).

There is a paucity of literature regarding the eating patterns and food choices of newly arrived migrant(39, 40) and refugee children in Australia(11, 21, 39). Anecdotal evidence suggests that refugee children often consume poorer quality, energy dense packaged food items in place of traditional foods. Although not studied some of the reasons cited to explain choosing these items are fitting in and acceptance by peers and the convenience offered by packaged foods(11).

Given the rising prevalence of childhood obesity and its health implications, it is important to increase current knowledge surrounding the dietary patterns of children. By learning more about the nutritional habits of refugee children, future health promotion activities involving refugee communities have the potential to be better informed and appropriately planned. The aims of the present study were to: (1) identify the main foods and beverages consumed at primary school by children of refugee background and; (2) compare their consumption patterns to children of non-refugee background. Our secondary objectives were to compare food and beverage consumption amongst refugee children from different language groups, and according to their length of stay in Australia.

This project was approved by the Sydney South West Area Health Service’s Human Research Ethics Committee and supported by the Department of Education and Training (DET).
Methods

Survey design and recruitment of participants

A cross-sectional survey of school food and beverage consumption in primary school children of refugee and non-refugee background was performed using the School Food Checklist tool (SFC) designed and utilized by Sanigorski et al(38).

The researchers approached two DET approved primary schools in the Fairfield LGA with a high representation of refugee children. From these two schools, the researchers recruited children of both refugee and non-refugee background. Recruitment of participants was facilitated by cooperation from the schools. The schools had the discretion of identifying participants that could be contacted for recruitment. For the refugee group, the researchers requested that children be between the ages of 5 to 12 years, have settled in the Fairfield area in the past 5 years and recruited according to seven language groups representing the largest refugee communities living in Fairfield LGA, as defined by settlement data from DIAC. These groups included:

- Arabic (Middle East)
- Arabic (Sudan)
- Assyrian (Middle East)
- Chaldean (Middle East)
- Dinka (Southern Sudan)
- Kirundi (Burundi), and
- Swahili (Eastern Africa).

For the non-refugee group, it was also requested that children were to be between the ages of 5 to 12 years and come from a non-refugee background. A total of 76 participants were recruited from both schools, with 39 in the refugee group and 37 in the non-refugee group.

To assist the schools with recruitment, the researchers provided each school with a letter inviting parents to attend an information session. This invitation was translated into the stated languages. Consent, withdrawal and participant information forms were also provided. Copies of forms and letters are provided in Appendices A-I. There was variation in terms of recruitment procedure followed by the two schools and these procedures were as follows:

The first school recruited kindergarten children only and this was a school-based decision. Refugee status was confirmed using children's visa numbers (i.e. visa subclass 200) recorded at the time of their enrolment at school. The school opted to send out information letters about the project to parents and guardians (refer to Appendix J for a copy). The information letters described the purpose of the project, the interview protocol that would be involved for participants and was accompanied by a consent form to be sent back to the school. Parental/guardian consent was also gained verbally over the telephone. Basic demographic details such as information pertaining to the
participants’ age, country of origin and language spoken at home were supplied by the school. Based on its records, the school was unable to provide the length of stay of participants in Australia.

The second school randomly selected children for the refugee group according to school stages (stage 1 relates to kindergarten to Year 2, stage 2 relates to students in Years 3 and 4 and stage 3 relates to students in Years 5 and 6), gender and the seven language groups as requested by researchers. Refugee children were identified as having visa subclass 200 during their enrolment at school. For the non-refugee group, children were also selected randomly according to school stages and gender. In addition to sending an information letter to parents (refer to Appendix K for a copy) along with consent form to be sent back to the school, the school agreed to hold a parent information session at their premises. The session was conducted in the morning by two primary researchers in English and translated in the seven language groups (stated above) by Bilingual community educators (BCEs). BCEs were recruited for each language group from a pool of BCEs working for the NSW Refugee Health Service. BCEs were trained by research investigators on the background and purpose of the project, their roles and responsibilities in interacting and translating contents of the information session, including the participant information sheet, consent form and withdrawal forms. During the session, written consent was gained from all consenting parents and guardians. Basic demographic details were collected from parents after written consent to participate was obtained. Parents who did not respond to the information letters or that were not able to attend the information session were contacted by telephone by the school, with the help of BCEs in contacting non-English speaking parents. The school provided parents with further details on the project and sought their verbal consent.

Parents and guardians of participants from both schools were invited to attend a free nutrition education session run by a dietitian addressing healthy lunchboxes and practical ideas, following completion of the project.

Data collection

Survey tool
The SFC was used to record the participants’ lunchbox contents (refer to Appendix L for a copy). The SFC tool consists of a single-page checklist designed to record food availability according to over 20 food and beverage categories coded according to: a) the number of servings (or actual weight), b) specific food descriptors (e.g. reduced fat), and c) food source (home, canteen or vending machine)(41). This tool has been used previously to assess food and beverage consumption of 1,681 primary school children (aged 5-12 years) in Western Victoria(38). The SFC has also been calibrated for use against a one day weighed food record in 106 children, with the two methods showing a mean difference of 15kJ and a Pearson’s correlation coefficient of 0.77 for energy values (41).
Due to the high amount of ‘junk food’ found in lunchboxes of primary school children in Western Victoria (38), an ‘extra foods’ category was also created in this study. This category incorporates foods and beverages from the SFC that are deemed as ‘extra foods’ by the Australian Guide to Healthy Eating (42). The category mainly comprises energy dense but micronutrient poor foods and includes: fast food, biscuits, cakes, pastries, muesli/fruit bars, packaged snacks, instant dry noodles, chocolate/lollies, sweet spreads, butter/margarine, sauces/mayonnaise, desserts, cordials and soft drinks.

Survey procedure
Surveys were conducted during September-October 2008 period. Two primary researchers conducted the survey of lunchbox contents and both received prior training in using the SFC. Part of this training was familiarizing with a food model book (43) which offers a photographic guide of various types of food and their serve sizes.

Children’s lunchbox contents were observed soon after arrival at school, before morning recess. Each child was individually met once in a separate room during class hours, accompanied by a school staff member and a representative of DET.

Each child was requested to unpack the food in his/her lunch box. While one researcher was engaging the child, the other recorded the lunchbox contents on the SFC. When there was unfamiliarity with the type of food, the child was asked to give more information about it. Lastly, each child was asked about any canteen orders or intended purchases he/she would make that day. This too was recorded in the SFC. The whole process lasted approximately 3 minutes.

There was no lunchbox data collected for one child who went home for lunch and one child who did not bring lunch nor had money to purchase food from the canteen due to unusual circumstances. The school provided foods for children without lunch. There were no withdrawals from the study.

Statistical analysis
Data was analyzed using Microsoft Excel version 2003 (Microsoft Inc.) and SPSS version 16.0 (SPSS Inc.). Analyses were performed on the entire sample and also on both the refugee and non-refugee groups. Descriptive statistics and frequency values were used to describe the basic demographics of all children (age, gender, language spoken at home) and length of stay of refugee children in Australia.

Using the SFC, total energy, mean energy and energy values for each food group were computed by multiplying the corresponding number of servings by a pre-calculated energy value per serve (41). The contribution of each food group to total energy intake was then derived. The proportion of foods present in children’s lunchboxes was also assessed using percentages. Independent sample t-tests were used to compare data between the refugee and non-
refugee groups, and to conduct an age and gender comparison among all children.

The amount of ‘extra foods’ present was categorized as follows: one serving: up to and including one serving, two servings: >1 and up to and including two servings, three servings: >2 and up to and including three servings, four servings: >3 and up to and including four servings, etc.

Statistical significance was accepted at $p \leq 0.05$ for all tests. Results are expressed as means±s.d. unless otherwise stated.
Results

Sample characteristics

There were a total number of 76 participants in this study, with 39 children in the refugee group and 37 children in the non-refugee group. Table 1 shows the distribution of participants based on four demographic characteristics namely: age, gender, language group and length of stay in Australia. There was a higher proportion of younger children than older children (mean age 7.3±2.3 years), with 5-8 year olds forming 66% of the overall group (data not shown). The data shows a relatively even proportion of boys and girls in the refugee and non-refugee groups.

Also displayed in Table 1 is the breakdown of languages predominantly spoken by refugee and non-refugee children at home. In the refugee group, half of the children spoke Assyrian, followed by Arabic (Middle East), Dinka and Swahili. None of the recruited children were Kirundi speaking children. The languages primarily spoken at home by non-refugee children were English (43.2%) followed by Vietnamese (13.5%), Serbian (8.1%), Assyrian (8.1%) and Arabic (8.1%).

Data on the length of stay of refugee children could only be obtained for 18 children. The mean length of stay of these refugee children in Australia was 5.6±3.2 years. Most of these refugee children were newly arrived (78%) as they had stayed in Australia for less than 5 years (data not shown). For the non-refugee group, 86% of children were born in Australia (data not shown).
<table>
<thead>
<tr>
<th>Table 1 Basic demographics of participants</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Refugee (n=39)</th>
<th>Non-refugee (n=37)</th>
<th>Total participants (n=76)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Mean Age</strong> <em>(years ± s.d.)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.5 ± 2.3</td>
<td>7.1 ± 2.3</td>
<td>7.3 ± 2.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>53.8</td>
<td>15</td>
</tr>
<tr>
<td>Male</td>
<td>18</td>
<td>46.2</td>
<td>22</td>
</tr>
<tr>
<td><strong>Language Group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assyrian</td>
<td>19</td>
<td>50.0</td>
<td>3</td>
</tr>
<tr>
<td>Arabic (Middle East)</td>
<td>8</td>
<td>21.1</td>
<td>3</td>
</tr>
<tr>
<td>Dinka</td>
<td>3</td>
<td>7.9</td>
<td>0</td>
</tr>
<tr>
<td>Swahili</td>
<td>3</td>
<td>7.9</td>
<td>0</td>
</tr>
<tr>
<td>Chaldean</td>
<td>2</td>
<td>5.3</td>
<td>0</td>
</tr>
<tr>
<td>Arabic (Sudan)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>Farsi</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>Turkish</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>Kirundi</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
</tr>
<tr>
<td>Serbian</td>
<td>0</td>
<td>0.0</td>
<td>3</td>
</tr>
<tr>
<td>Tongan</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Khmer</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Spanish</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Chinese</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>English</td>
<td>0</td>
<td>0.0</td>
<td>16</td>
</tr>
</tbody>
</table>

**Mean Length of Stay in Australia** *(years ± s.d.)*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.6 ± 3.2</td>
</tr>
</tbody>
</table>

*Missing data for one refugee child

*Missing data for 21 refugee children
Food source

Nearly all children brought foods from home (95%) and these made an 88% energy contribution to school food intake (data not shown). The canteen was used by 29% of children to buy additional snacks or lunches. The most popular foods bought from the canteen were desserts (primarily ice cream poles) and fast food (mostly nuggets or pizza) (data not shown). Children from the non-refugee group purchased significantly more desserts (p=0.021) and ‘extra foods’ (p=0.04) than children from the refugee group (data not shown).

Food types and occurrence in lunchboxes

The food consumption patterns observed were similar among refugee and non-refugee groups. Table 2 lists the most common foods and beverages consumed among children in this study along with their energy contribution. The lunchbox foods most frequently consumed were:
- bread (67.1%)
- packaged snacks (mainly potato chips) (56.6%)
- fruit (38.2%)
- meat/seafood/egg filling (36.8%)
- biscuits/crackers (28.9%)
- chocolate/lollies (22.4%) and
- sweet spreads (20.5%).

Foods that contributed most to energy intake at school were:
- bread (23.2%)
- packaged snacks (16.0%)
- fast food (10.2%) and
- fruit (7.3%).

Fruit juices/cordials (50%) were the most frequently consumed beverages and contributed 9.1% to energy intake. Overall, data showed that younger children (5-8 years) had significantly more fruit juice/cordial (p=0.04) and ‘extra foods’ (p=0.002) in their lunchboxes than older children (>8-12 years). The consumption of foods and beverages was similar in both genders except that girls had significantly more packaged snacks in their lunchboxes than boys (p=0.033).
Table 2  Foods and beverages commonly consumed at school among 76 children aged 5-12 years and their contribution to energy intake

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Energy (kJ)</th>
<th>Mean Energy (kJ)</th>
<th>Percentage of occurrence in lunchboxesa (%)</th>
<th>Mean number of servingsb (95% CI)</th>
<th>Energy and contribution to energyb (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=76)</td>
<td>(n=39)</td>
<td>(n=37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy (kJ)</td>
<td>190826</td>
<td>100824</td>
<td>90002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Energy</td>
<td>2511</td>
<td>2585</td>
<td>2432</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Bread</td>
<td>67.1</td>
<td>69.2</td>
<td>64.9</td>
<td>0.9 (0.7-1.0)</td>
<td>0.9 (0.7-1.1)</td>
</tr>
<tr>
<td>Packaged snacks</td>
<td>56.6</td>
<td>66.7</td>
<td>45.9</td>
<td>0.8 (0.6-0.9)</td>
<td>0.8 (0.6-1.0)</td>
</tr>
<tr>
<td>Fruit</td>
<td>38.2</td>
<td>35.9</td>
<td>40.5</td>
<td>0.5 (0.3-0.7)</td>
<td>0.5 (0.3-0.8)</td>
</tr>
<tr>
<td>Meat/seafood/egg filling</td>
<td>36.8</td>
<td>41.0</td>
<td>32.4</td>
<td>0.5 (0.3-0.7)</td>
<td>0.6 (0.3-0.7)</td>
</tr>
<tr>
<td>Biscuits/crackers</td>
<td>28.9</td>
<td>20.5</td>
<td>37.8</td>
<td>0.5 (0.3-0.6)</td>
<td>0.3 (0.1-0.6)</td>
</tr>
<tr>
<td>Chocolate/lollies</td>
<td>22.4</td>
<td>17.9</td>
<td>27.0</td>
<td>0.3 (0.1-0.4)</td>
<td>0.3 (0.0-0.5)</td>
</tr>
<tr>
<td>Sweet spreads</td>
<td>20.5</td>
<td>21.9</td>
<td>18.9</td>
<td>0.2 (0.1-0.4)</td>
<td>0.2 (0.1-0.4)</td>
</tr>
<tr>
<td>Cheese filling</td>
<td>10.5</td>
<td>7.7</td>
<td>13.5</td>
<td>0.1 (0.0-0.2)</td>
<td>0.1 (0.0-0.2)</td>
</tr>
<tr>
<td>Muesli/fruit bars</td>
<td>10.5</td>
<td>5.1</td>
<td>10.8</td>
<td>0.1 (0.0-0.2)</td>
<td>0.1 (0.0-0.2)</td>
</tr>
<tr>
<td>Vegetable/salad filling</td>
<td>9.2</td>
<td>12.8</td>
<td>5.4</td>
<td>0.1 (0.0-0.2)</td>
<td>0.2 (0.01-0.3)</td>
</tr>
<tr>
<td>Extras (saucess/mayonnaise)</td>
<td>9.2</td>
<td>10.2</td>
<td>8.1</td>
<td>0.1 (0.0-0.2)</td>
<td>0.1 (0.0-0.2)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>7.9</td>
<td>10.3</td>
<td>5.4</td>
<td>0.1 (0.0-0.1)</td>
<td>0.1 (0.0-0.2)</td>
</tr>
<tr>
<td>Cakes/buns/muffins/scones</td>
<td>6.6</td>
<td>7.7</td>
<td>5.4</td>
<td>0.1 (0.0-0.1)</td>
<td>0.1 (0.0-0.2)</td>
</tr>
<tr>
<td>Butter/Margarine</td>
<td>6.4</td>
<td>0.0</td>
<td>10.8</td>
<td>0.1 (0.0-0.1)</td>
<td>0.0</td>
</tr>
<tr>
<td>Fast food</td>
<td>5.3</td>
<td>7.7</td>
<td>0.0</td>
<td>0.2 (0.0-0.2)</td>
<td>0.2 (0.0-0.2)</td>
</tr>
<tr>
<td>Desserts</td>
<td>5.3</td>
<td>2.6</td>
<td>8.1</td>
<td>0.2 (0.0-0.2)</td>
<td>0.1 (0.0-0.1)</td>
</tr>
<tr>
<td>Brown Bread</td>
<td>3.9</td>
<td>7.7</td>
<td>0.0</td>
<td>0.1 (0.0-0.2)</td>
<td>0.1 (0.0-0.3)</td>
</tr>
<tr>
<td>Yoghurt</td>
<td>3.9</td>
<td>2.6</td>
<td>5.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Beverages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit juice/cordial</td>
<td>50</td>
<td>59</td>
<td>67.6</td>
<td>0.6 (0.4-0.7)</td>
<td>0.7 (0.5-0.8)</td>
</tr>
<tr>
<td>Water</td>
<td>32.9</td>
<td>25.7</td>
<td>40.5</td>
<td>0.5 (0.3-0.7)</td>
<td>0.4 (0.2-0.7)</td>
</tr>
<tr>
<td>Soft drinks</td>
<td>5.3</td>
<td>5.1</td>
<td>5.4</td>
<td>0.1 (0.0-0.1)</td>
<td>0.0</td>
</tr>
<tr>
<td>Milk</td>
<td>1.3</td>
<td>2.6</td>
<td>0.0</td>
<td>0.0 (0.0-0.1)</td>
<td>0.1 (0.0-0.1)</td>
</tr>
<tr>
<td><em>Extra Foods</em></td>
<td>92</td>
<td>92</td>
<td>87</td>
<td>3.2 (2.4-3.3)</td>
<td>3.0 (2.1-3.4)</td>
</tr>
</tbody>
</table>

- * Significantly different from refugee group (p<0.05)
- a Food categories that occurred less than 3% have been omitted from the table
- b Food sources combined (lunchbox and canteen)
- c The ‘extra foods’ category includes: fast food, biscuits, cakes, pastries, muesli/fruit bars, packaged snacks, instant dry noodles, chocolate/lollies, sweet spreads, butter/margarine, sauces/mayonnaise, desserts, soft drinks, and fruit juices/cordials
- CI - confidence intervals
Contribution of ‘core’ and ‘extra foods’ to energy intake at school

Foods listed in the SFC were categorized into ‘core’ and ‘extra’ food groups as defined in the Australian Guide to Healthy Eating(42). Figure 1 illustrates the energy contribution of ‘core’ and ‘extra’ food groups towards total energy intake. ‘Extra foods’ contributed the most energy (61%), followed by the bread (25%), fruit (excluding fruit juice/drinks) (7%), meat (4%), dairy foods (3%) and vegetables (<1%) core food groups.

![Figure 1: Contribution of the Australian Guide to Healthy Eating's extra and core food groups to the overall energy intake of children at school](image)

This study found that 90% of children had ‘extra foods’ in their lunchboxes (mean servings 3.2±1.9) (Table 2), with close to two-thirds of the children (63.2%) having 2-4 servings of ‘extra foods’ (data no shown). Figure 2 shows the proportion of energy contributed by food categories belonging to the ‘extra foods’ group to the children’s energy intake of ‘extra foods’ at school. It shows that out of all ‘extra foods’, packaged snacks (mainly potato chips) (26.6%) contributed the most towards energy intake derived from ‘extra foods’ followed by fast food (mostly pizza or chicken nuggets) (16.9%) and fruit juice/cordial (15.1%).
Figure 2  Contribution by food category to the children's energy intake of 'extra foods' at school.
Discussion

This study aimed to identify the main foods and beverages consumed by primary school children of refugee background and to compare them to children of non-refugee background. Most children brought food from home and foods identified as most frequently consumed were bread, packaged snacks, fruit juice/cordial, fruit, meat/seafood/egg filling, biscuits/crackers, chocolate/lollies and sweet spreads. The results show that the food and beverage consumption of refugee and non-refugee children were similar. The results also highlight that the majority of children, irrespective of refugee status, consumed a high proportion of ‘extra foods’ which are energy-dense and often come in the form of pre-packaged snacks.

Under the ‘extra foods’ category, packaged snacks contributed the most to energy intake followed by fast food and fruit/juice cordial. By far, the most common type of snack observed was potato chips. Other foods belonging to the ‘extra foods’ category, such as chocolate/lollies, biscuits/crackers and desserts, were also commonly observed in children’s lunchboxes. Nearly all children had ‘extra food’ in their lunchboxes with a mean of 3.2±1.9 servings. This mean is similar to the one previously reported in 1,681 primary school children in Victoria(38).

The results from this study are not surprising as they are comparable to findings from existing studies that have reported a high proportion of ‘extra foods’ consumed by primary school children during school hours(38, 44, 45) and based on extrapolated data on children from the most recent 1995 National Nutrition Survey(37, 45). Overall, as much as 58% of children’s total energy intake at lunch was derived from ‘extra’ foods. Although this study focused on the lunch meal only, this percentage is in agreement with the previously reported 41% contribution of ‘extra foods’ to daily energy intake of children aged 2-18 years(46).

Consumption of ‘extra foods’, which can be high in fat, sugar and therefore energy, can displace intake of important core food groups and contribute to weight gain(30, 47, 48). A 2004 review of existing evidence on the diet and nutrition causes of obesity identified that “high intake of energy-dense, micronutrient-poor foods” was a “convincing” risk factor for obesity(48). Our data highlights a relatively high proportion of sweetened drinks being consumed at school, with 11% of total energy intake derived from sweetened beverages alone. Many studies have confirmed that consumption of sweetened beverages such as soft drinks, fruit juices, sports drinks, cordials and flavoured milks is associated with overweight and obesity(30, 38, 49, 50). This is especially concerning for children as many food preferences and habits are formed in childhood and tend to be maintained into adulthood(51).

Foods that can contribute important nutrients such as vegetables, meat/fish/poultry/eggs/nuts/legumes and dairy were infrequently consumed at
school by all children in this study. For instance, the mean number of serves for fruit intake was half a serve and for vegetables, one tenth of a serve. This is comparable to low intakes reported in the 1995 NNS survey and the NSW health survey(51, 52). The Australian Guide to Healthy Eating recommends children aged 4-7 years to eat two serves of vegetables and one fruit, and 8-11 years to eat three serves of vegetables and one fruit(42). Our data shows that children are most likely not meeting these recommendations.

Twenty-nine percent of children reported that they intended to purchase food and/or beverages from the canteen. The majority of food preferences included less healthy options, such as desserts (primarily ice cream poles) and fast food (mostly nuggets or pizza). This is despite the canteens having healthy alternatives available, with both schools being part of the NSW Healthy School Canteens. These findings are consistent with other studies examining canteen purchasing practices of primary school children(34, 38, 53).

There is a growing trend towards packaged snack foods being included in children’s lunchboxes(31, 38, 46). Many factors can contribute to this trend including food safety, its increased convenience for busy parents and junk food marketing towards children. Studies on the extent of children’s exposure to food advertising on Australian television report high-fat or high-sugar foods, such as confectionery and fast food restaurants, as the most advertised food categories during children’s viewing hours, with fruit and vegetables being advertised the least(54, 55). A more recent study conducted on Sydney’s commercial television stations reported that in 2006-2007, ‘persuasive’ junk food advertisements that use competitions and ‘give-aways’ were 18 times more common during popular programs for children compared to adult programs(56).

As a response to the significant amount of junk food advertising to children, the Australian Food and Grocery Council has taken action during late October this year and made a submission to the Australian Communications and Media Authority in response to its draft “Children’s Television Standards 2008”. The submission includes “The Responsible Children’s Marketing Initiative”, where companies participating in this initiative will commit to targeting children under 12 years old, aiming to further the goal of promoting healthy dietary choices and healthy lifestyles. The initiative will apply to all television, radio, print, cinema and internet advertisement where the audience is predominantly children under 12 years(57).

While results from our study show that the food and beverage consumption of refugee and non-refugee children were similar, this does not infer that refugee status did not have any impact on the dietary choices of refugee children. The reality that refugee children may experience various nutrition issues prior to and upon settlement needs to be recognized by teachers, health workers and any other people who work with refugee children. Many refugee children have experienced great hardship prior to arrival in Australia which could have impacted
on their nutritional status. Upon settlement, common problems surrounding refugee children include unfamiliarity with the concept of packing school lunches, eating during school hours, difficulty in packing traditional foods and pressure from children to include more ‘Australian foods’ in their packed lunches(58, 59). Such foods may include heavily marketed junk or packaged snacks, which can be unhealthier replacements than traditional foods.

The findings showed that all children irrespective of refugee status consumed a high proportion of ‘extra foods’. Although our sample size was too small to do significance testing based on length of stay or language group, it appears that the food consumption patterns were similar among children with different lengths of stay and from different language groups. This raises the possibility that children from a refugee background in this study have acculturated very quickly to a new food environment. In addition, a significant portion of children in the non-refugee group were children of migrants, and it is also possible that they have acculturated quickly. Dietary acculturation can bring along both healthful and unhealthful changes towards the food choices of migrants or refugees. There exists a diversity of adopted changes between different refugee communities. Culture plays a dynamic influence in fostering healthy eating amongst Australian migrants(39) and the maintenance of traditional food intake has also been associated with lower rates of obesity and sedentary behaviours among Australian migrant children(21). There is little data on the prevalence of overweight and obesity amongst refugee children in Australia, with one study reporting 27% of their study population comprising of refugee and migrant children being overweight or obese(9). However, it is also important to note that there is a co-existence of obesity and under-nutrition among migrants or refugees from specific ethnic groups(9).

Overall, the main implications from this survey are for improving the lunchbox contents of school children, with special focus on healthier options for snacks. It is recommended that healthier alternatives such as fruit, vegetables and sandwiches be emphasized for children and parents who prepare children’s lunches, instead of energy-dense micronutrient poor “junk food” such as potato chips, the most common packaged snack found in this study. Developing healthy food preferences and habits early in life are important as these habits can track into adulthood(51). Our recommendation support existing government initiatives aimed at promoting greater intakes of fruit and vegetables in children(51).

The findings from this study highlight the pressing need for school health policies and interventions to actively promote healthy eating among children with active involvement of parents. There is currently a number of school initiatives in NSW aimed at reducing the “obesogenic” environment of schools including the NSW Healthy School Canteen Strategy(60). Interventions targeting parents are crucial in increasing their awareness and skills in making healthier food choices for their children(29). In NSW, a few nutrition education programs featuring a parent education component have now moved beyond the pilot phase and are regarded as health promotion models for targeting nutrition issues in school children from
low socio-economic backgrounds(61). For example, the Tooty Fruity Veggie project has shown a positive influence on children’s eating habits and parents’ knowledge of food issues(62). Although the most successful approaches to school-based interventions addressing childhood obesity are still being examined, effective interventions are clearly needed(63, 64). With these promising programs in the community and the NSW Healthy School Canteen setting the tone for change, a school-driven nutrition education program for parents could be an additional strategy to help counteract the rising problem of childhood obesity and provide the support recommended by the NSW and national obesity prevention strategies.

To our knowledge, there has been very limited research that has looked at primary school children’s intake at school from a longitudinal perspective. This is in part due to the fact that monitoring and evaluation tools to be used in a school setting are still being developed(41, 65-68). It would be worthwhile to look at children’s intake at school over time to gain a better representation of their school dietary habits and to see whether specific interventions are effective. It would also be important to examine how children’s intake change in the first weeks of school, food sharing habits among school children and how these impact their energy intake. Further, it would be interesting to study how parents’ and children’s preferences influence the preparation of children’s lunchboxes, to identify parents’ challenges in making healthy lunchboxes and to assess foods eaten outside of school hours. It may be worthwhile to investigate how the process of acculturation differs between refugee children and adults. For instance, children’s exposure to the school setting, with the added pressure of ‘fitting in’ with their peers can be a major influence on their dietary preferences and choices.

Although the lunchboxes of refugee and non-refugee children warrant healthier choices, another implication from this study is that health and nutrition interventions should embrace schools as a whole, and also engage parents and child carers in promoting healthy eating. In terms of nutrition interventions that are specific to refugee communities, workers should take into account the specific needs of these communities including previous nutrition knowledge, difficulty adapting to a new food system, and knowledge in making healthy, practical and safe lunches for school children(10, 11). It is recommended that any education intervention provided also emphasize the maintenance of traditional foods(10, 21).

Whilst this is, to our knowledge, the first study in Australia to look at the lunchbox contents of school refugee children, there were several limitations presented by this study. The two schools involved recruited participants through slightly different procedures, with one school also offering an information session for parents. However, the majority of participants were recruited through the same means, that is through information notes and consent forms sent home with the students. The types of foods mainly consumed by participants from both schools were similar, most notably ‘extra foods’. Although one school recruited younger children than the other, this did not change the main findings of the study. Except for a few differences in the amounts of foods consumed, age and sex did not affect the main
food consumption patterns observed in our study. In addition, the selection of the non-refugee group could have been problematic as some migrant children could have originated from a “refugee-like” background. However, children from the non-refugee group were either born in Australia or had settled in Australia for more than five years.

Another limitation was the cross-sectional nature of the study which in essence captured only a snapshot of participants’ school lunches that day. It is possible that the findings of a high amount of ‘extra foods’ on days where researchers went to the schools could have been due to chance. Parents’ awareness of the research project could also have influenced some parents to make their children’s lunchboxes healthier. However, these possibilities are unlikely as researchers went three times to one school, and once to the other, and on all four days a high proportion of ‘extra foods’ was found in children’s lunchboxes. The study was of a descriptive nature and inferences about causation could not be made.

It must be noted that there lies much controversy behind the naming and classification of energy dense micronutrient poor foods, sometimes referred to as ‘junk foods’(69). This study has aimed to minimise these limitations by adopting the term ‘extra foods’ and incorporating foods from the SFC considered as ‘extra foods’ in the Australian Guide to Healthy Eating (42).

Also, due to time constraints, participants could only be recruited in small numbers. The small sample size precluded researchers from performing more advanced statistics such as categorical analysis based on language or length of stay subgroups. A bigger sample size would have increased the power of the study and the probability of detecting significant differences amongst groups and subgroups. Nonetheless, future studies can replicate this preliminary investigation on a larger scale and survey lunchboxes at several points in time.

The data derived from the SFC is qualitative rather than quantitative. Nonetheless, the SFC provides a quick and convenient tool to monitor children’s lunchbox contents(41). Good inter-researcher reliability has been reported for the SFC, and in this study, researchers actually saw each child together further strengthening the observations. Foods were recorded easily according to food categories. In terms of surveying foods, there was only difficulty in assessing the amount of filling present in some wrapped sandwiches that were not fully unwrapped for food safety purposes. In these cases, the children were asked about the sandwiches’ content but did not always know what was inside. In addition, although most children brought lunches from home and canteen foods contributed 12% to energy, the actual number of servings of canteen foods purchased by children could not be accurately assessed. Researchers had to rely on children’s feedback as there was no possible visual assessment of canteen foods. Despite these quantitative limitations, the SFC provides information regarding the types of foods found in children’s lunchboxes.
In summary, the present study highlights the overrepresentation of less healthy foods in the lunchboxes of primary school children. By capturing a snapshot of the foods refugee and non-refugee children eat at school, it provides valuable insight into the potential eating habits of refugee and non-refugee children at school and can inform future health promotion activities. Interventions aimed at promoting healthy eating in school children should also target the home preparation of lunchboxes.
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Conflict of Interest Statement

None declared.
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