Original Article

Calibration and reliability of a school food checklist: a new tool for assessing school food and beverage consumption

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There is a pressing need in Australia and other countries to develop systems for monitoring secular trends in childhood obesity and related behavioural and environmental determinants. Energy from foods and beverages consumed at school is an accessible indicator of children's eating patterns and we have developed a school food checklist (SFC) to measure this. The SFC records the number of serves and source (home, canteen, vending machine) of 20 food and beverage categories. This study aims to assess the accuracy and to calibrate the SFC by comparing it to a weighed record (WR) and to evaluate inter-recorder reliability. Participants were 910 primary school children aged 5 to 12 years from a rural township in Victoria, Australia. WR were collected from a non-random sub-sample of 106 and a second sub-sample (n=46) had intake measured twice using the SFC to assess inter-recorder reliability. Mean energy values were 2992 kJ ± 924 and 3008 kJ ± 952 for the SFC and WR respectively and the correlation coefficient was strong (Pearson r = 0.77). The mean difference between the WR and SFC methods was 15 kJ (95% CI, -107 kJ to 138 kJ) and the limits of agreement (±2 standard deviations) were ± 1270 kJ. The SFC overestimated the energy/serve of breads and fruit drinks and under-estimated energy/serve from fat spreads, biscuits/crackers, muesli/fruit bars and fruit. Inter-recorder reliability was good (kappa 0.51). The SFC was designed to measure energy from food and beverages in schools. It has good accuracy and reliability and the revised version should further improve accuracy of the instrument.

Key Words: dietary assessment, schools, obesity prevention, children

Introduction

The prevalence of childhood obesity is increasing in Australia and it is likely that inappropriate eating patterns are a major contributor. This is difficult to demonstrate however, because we do not have a system in place to regularly monitor children's eating patterns. For other epidemics, such as tobacco and road injuries, monitoring has been invaluable for benchmarking current status, tracking prevalence and informing decision makers.[1,2] Unfortunately, this is not the case for obesity. The last national health and nutrition survey in Australia was in 1995. Moreover, very few instruments exist to indicate current status and trends in obesity promoting behaviours or environments. Consequently, there have been very few studies describing what children eat at schools in Australia. The lack of tools, and therefore data, not only hinders our ability to monitor key determinants of obesity but it also hinders our ability to evaluate the effectiveness of obesity prevention initiatives.

To be of value for monitoring population health, an indicator needs to be related to health outcomes (in this case obesity) and be simple, reliable (repeatable), cost effective, sensitive (to measure change), easy to understand and relevant to decision-makers.[3]

Using these criteria, our goal was to develop an indicator of children's school food and beverage consumption that could be used to monitor eating patterns. We were particularly interested in schools because they offer ready access to children and food and beverages consumed at school are likely to reflect a child's overall eating patterns[4] – particularly in Australia, where most children bring lunches that have been packed at home.[5] Moreover, there is growing evidence to suggest that schools and other settings can have an important influence on children's eating behaviours.[6,7] The instrument we developed was an administered school food checklist (SFC) designed to record foods and beverages consumed (or at least intended to be consumed) at school. The SFC allows information about observed foods and beverages to be recorded quickly (≈3 minutes per child). Aside from clarifying information about foods and beverages that may have already been consumed and whether

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foods or beverages will be obtained via another source (ie. school canteen), it requires minimal interaction with the child. Furthermore, it is inexpensive and the information collected can be analysed easily and efficiently. The aims of this study were to assess the accuracy (compared to a weighed record) and reliability of the checklist and also to calibrate the energy per serve and serve sizes of the food and beverage categories.

Methods

Participants

Participants in this study came from six primary schools participating in a community based intervention project in Colac, Victoria. Written consent was obtained from parents or guardians of all participants and ethics approval was given by the Deakin University Human Research Ethics Committee. A convenience sub-sample of 106 participants (41 boys and 65 girls, 5-12 yo) was drawn to assess the accuracy of the SFC instrument. A second convenience sub-sample of 46 participants (19 boys and 27 girls, 5-12 yo) was drawn to assess inter-recorder reliability. These two sub-samples represented 12% and 5% of all 5-12 yo children (N = 910) participating in the baseline survey. The SFC and WR data were collected during May – July, 2003.

Instruments

The SFC is a single page checklist. It includes 20 food and beverage categories that are coded according to the number of serves (including space to write down the actual weight available on the packaging), specific descriptors (eg. reduced fat), and food source (home, canteen or vending machine). Specific foods in each of the categories were included based on frequency of consumption at school by children aged 5 to 15 years of age in the National Nutrition Survey (NNS95). In the fruit category for example, we included apples (consumed by 18.3% of children), bananas (6.7%) and oranges (5.0%), other citrus (4.1%), stone fruit (2.8%), pears (1.4%), pineapple (0.9%) and berry fruit (0.6%). Serve sizes were based on standard serves included in FoodWorks Professional Edition (version 3; Xyris Software, Highgate Hill, QL, Australia). Where these were not available, recommended serves from specific food and beverage products were used or, where several foods with varying serve sizes were included in a food group (eg. fast foods), an average serve size was calculated based on typical serve sizes from NNS95. Energy per serve was calculated from the energy density (kJ/g) of each of the foods included in the food (or beverage) category, weighted by their frequency of consumption by children aged 5 to 15 years in NNS95. In this way, foods consumed most commonly in the category contributed the most to the energy density value for that category. For single food item categories, energy per serve was obtained from FoodWorks.

WR information was recorded on a separate sheet specifying the food/beverage type and amount. A set of Masscal® Food Scales (Model 331, Scoresby Australia) were used to weigh the food and beverage items. We considered the WR our reference method for the purpose of assessing the accuracy of total energy estimated by the SFC.

Protocol

Data were collected at each school in the morning, prior to children consuming food at either recess or lunch. One recorder entered the foods and beverages from the child's lunch box and/or lunch order using the SFC and a second, separately located, recorder weighed each food and recorded the information on the WR sheets. We recorded foods from all sources including those from home, vending machines, school canteen or lunch services and shops. For sandwiches, we recorded the type of bread (white or brown) and the fillings or spreads included. Where it was difficult to determine what a sandwich contained we asked the child to open the sandwich for viewing (where possible) and/or to describe the contents. Our protocol for unusual foods was to place them in the most appropriate category or omit them based on consensus between at least two recorders. During the recording procedure children were asked if they had previously consumed any food/beverage from their school lunch and if they had, these were included on their record (and in the case of the weighed record, the weight was estimated from information about the size of the food or amount of beverage). Similarly, children were also asked if they had consumed or would be consuming food or beverage obtained from a vending machine, school canteen or lunch order service. Where this occurred the information was recorded as usual and the source noted (ie. Vending Machine or Canteen) in a corresponding column on the SFC. Few children reported that they would be consuming food and beverages at home, and those that did were excluded from the study. Children were unaware that records relating to their lunch food and beverages were to be collected, and recording was conducted for 1 day only.

Four research staff acted as SFC recorders and one as the WR recorder (same person for all WRs). Each recorder had attended a training session outlining data collection procedures and had experience recording dietary information. A serve-size manual containing pictures of a standard serve for various foods and beverages was also provided to each of the SFC recorders.

Analysis and statistics

Energy values were computed from the SFC by multiplying the total number of serves by the pre-calculated energy per serve. For the WR, energy was calculated using FoodWorks. Energy values for foods and beverages not contained in this program were obtained from a local dietary reference manual.[8] A number of statistical tests were used as a means of determining the accuracy of the total energy as assessed by the two methods. Means and standard deviations were compared and a correlation coefficient (Pearson's r) was computed to examine the strength of the relationship between energy assessed by the two methods. We also calculated the percentage of participants who fell into the same and opposite tertiles for energy. If there is no agreement between methods

Table 1. Total energy, food weight and energy density of the 20 school food checklist food and beverage categories as assessed by the school food checklist and the weighed record (*N* = 106).

Category	Serve size (g/ml)	Energy/serve (kJ/serve)	School Food Checklist*					Weighed Record*		
			Frequency in lunch boxes (%)	Total serves (n)	Total energy (kJ)	Total weight (g)	Energy density (kJ/g)	Total energy (kJ)	Total weight (g)	Energy density (kJ/g)
Bread/Roll	70	697	93	103.5	72139	7245	9.9	67591	6565	10.3
Fillings										
- Meat etc	30	170	27	33.0	5618	990	5.7	4927	776	6.4
- Cheese	20	322	23	27.0	8694	540	13.1	10582	681	15.5
- Vegetable/Salad	20	14	8	9.0	129	180	0.7	288	276	1.1
- Peanut butter	20	496	15	19.0	9424	380	24.8	5316	214	24.8
- Vegemite/Marmite	5	41	24	25.0	1037	125	8.3	1305	220	5.9
- Sweet spreads	20	312	22	23.5	7325	470	15.6	6607	458	14.4
- Butter/Margarine	7	155	80	97.5	15171	682	22.2	3802	605	27.7
Fast Food	140	1389	1	1.0	1384	140	9.9	0	421	9.0
Leftovers/Mixed dishes	160	883	0	0.0	0	0	13.6	0	0	NA
Noodles	65	1133	0	0.0	0	0	17.4	21605	0	NA
Packaged snacks	25	527	39	44.5	23454	1137	21.1	52750	1019	21.2
Biscuits/Crackers	12	230	65	208.8	48104	2505	19.2	13990	2751	20.6
Chocolates/lollies	25	410	26	28.5	11671	712	16.4	2863	742	18.8
Cheese/Eggs/Dried fruit/Nuts	20	283	7	14.0	3963	280	14.1	19631	250	11.5
Muesli bars/Fruit bars	30	448	33	33.8	15169	1014	14.9	20568	1267	15.5
Cakes/Buns/Muffins/Scones	80	1211	26	21.4	25875	1712	15.1	1307	1358	15.2
Pastries	70	1223	1	1.0	1223	70	17.5	1491	81	16.1
Desserts	90	466	3	4.2	1933	378	5.2	4090	377	4.0
Yoghurt- *Reduced Fat?*	200	751 [N]	9	1.0	3817	1020	3.8	29056	949	4.3
		640 [Y]	1	5.1	640	200	3.2		200	3.2
Fruit	140	296	69	83.0	24547	11620	2.1	393	13125	2.2
Vegetables	40	29	4	5.5	158	220	0.7	0.0	526	0.7
Milk - *Low fat?*	250 ml	788 [N]	0	0.0	0	0	3.1	0	0	NA
		537 [Y]	0	0.0	0	0	2.1	0	0	NA
Soft drinks - *Diet?*	375 ml	727 [N]	0	0.0	0	0	1.9	32562	0	NA
		7 [Y]	0	0.0	0	0	0.0		0	NA
Fruit juice/Cordials	250 ml	409	43	87.3	35723	21825	1.6	0	20916	1.6
Water	250 ml	0	22	45.0	0	11250	0.0		11785	0.0

* Includes foods and beverages from home, vending machine and school canteen/lunch order service.

then, by chance, 33% would fall into the same tertiles, 44% into adjacent tertiles, and 22% into opposite tertiles. With perfect agreement between methods the percentage of people in each of these categories would be 100, 0, and 0% respectively. Finally, Bland-Altman tests of agreement between methods were computed.[9] These tests provide a comparison between two methods of measurement. Differences between methods are plotted against means for the two methods. Agreement is assessed by evaluating the overall bias (the mean of the differences between methods), the differential bias (the relationship between the difference and the mean values) and the spread of the agreement between the two methods (± 2 standard deviations).

We were also interested in calibrating, where necessary, energy per serve and serve size in the SFC using information from the WR. To do this, total energy, food weight and energy density were computed for each of the 20 food and beverage categories in the SFC. For comparison, foods recorded in the WR were grouped into these same categories. We then adjusted the energy per serve or serve size in the SFC where the difference in weight or energy between the WR and the SFC was larger than one serve per category or where energy density was lower or higher than expected for that category. Inter-recorder reliability was evaluated using two methods. We used the kappa statistic to compare how frequently the recorders classified the number of serves per lunch box into the same or opposite tertiles. We then used a method to identify major or minor errors in coding for the following categories: bread (including bread type); fillings; biscuits; beverages; and all other foods. Each entry (or non-entry in the case of an omission error) was coded as ‘same’ (identical coding by the two recorders), ‘minor error’ (the two entries varied by ≤ 1 serve or white bread was ticked instead of brown), and ‘major error’ (the two entries varied by more than 1 serve, or entries were either added, omitted or misclassified). Data entry was performed by two of the authors (PK and CB). All analyses were performed using SPSS, version 11 (SPSS Inc, Chicago, IL, USA). Statistical significance was accepted at $P < 0.05$.

Results

Comparisons between the two methods

Mean energy was similar between the SFC method (2992 kJ, SE 90 kJ) and the WR method (3008 kJ, SE 92 kJ). Moreover, the correlation coefficient for energy values obtained via the two methods was strong (Pearson’s r = 0.77, P<0.01). The tertile cross-classification of energy values revealed that the percentage of children classified into the same tertile was substantively different (65%) to the percentages expected by chance (33%). Furthermore, the percentage of children misclassified into opposite tertiles was low (4%). Figure 1 shows the Bland-Altman plot. This figure reveals a similar level of agreement. Overall, the mean of the difference between the methods (ie. bias) was 15.26 kJ (95% confidence interval, -107 kJ to 138 kJ) and the limits of agreement (± 2 standard deviations) were ± 1270 kJ around the bias. The relationship between the difference and the average values for energy was not statistically significant.

SFC calibration

The information used for calibrating the SFC is shown in Table 1. Overall, food and beverage category differences in total energy, food weight or energy density between the SFC and the WR were not large. However, there were seven food and beverage categories where frequency of consumption was high enough (consumed by more than 30% of children) that we could make judgements about SFC accuracy. Total energy from bread/rolls and the total weight of food in this category were higher by 4539 kJ and 680g respectively in the SFC compared with the WR. Energy per serve and serve size values for this category

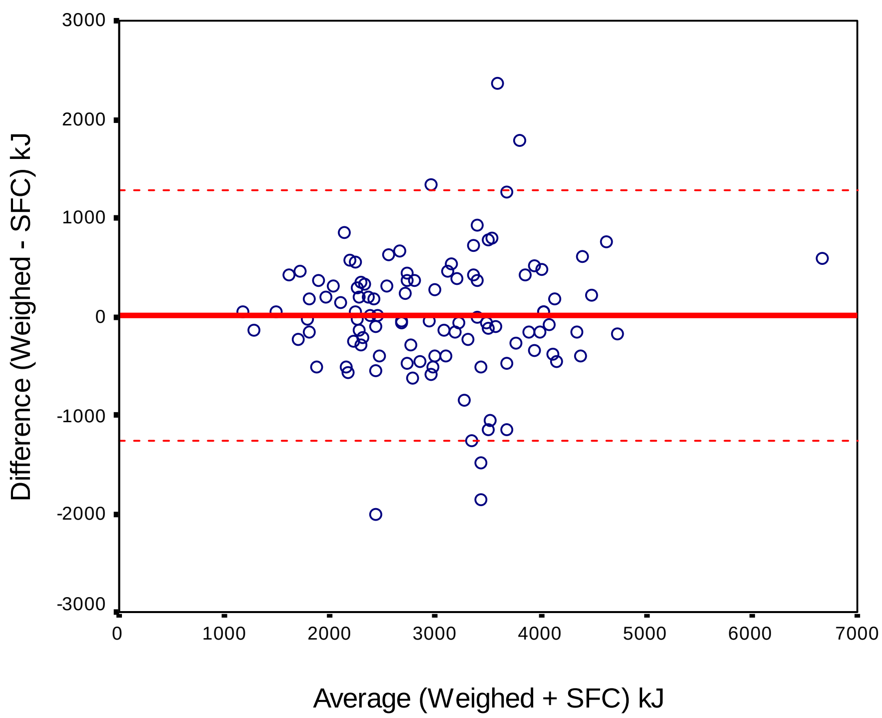

Figure 1. Bland-Altman plot of the difference in total energy (kJ) for the WR and SFC methods.

Table 2. Cross-classification of tertiles of lunch size (based on total serves*) derived by recorder 1 and recorder 2 (*N*, row %)

		Recorder 2							
		Small lunch		Medium lunch		Large lunch		Total	
Recorder 1	Small	13	87%	2	13%	0	0%	15	100%
	Medium	3	21%	5	36%	6	43%	14	100%
	Large	1	6%	3	18%	13	77%	17	100%
	Total	17	37%	10	22%	19	41%	46	100%

* Cut-offs for the three groups were, small (0.0 – < 7.0 serves), medium (≥ 7.0 - < 9.0 serves) and large (≥ 9.0 serves)

were calculated using average values for sliced bread, a white bread roll and pita bread. The WR data suggest that most children had sliced white bread so we have adjusted the SFC serve size value for this category to 65 g and the estimated energy to 650 kJ to reflect this. The total weight of butter/margarine was also over-estimated (+ 77.5 g) in the SFC compared to the WR, however, energy was lower (-1566 kJ). This was accounted for by the reduced fat spreads in the original calculation of energy per serve. To more accurately represent fat spreads in the SFC, we used an energy density of 28 kJ/g (the energy density of regular fat spreads) and adjusted energy per serve accordingly to 196 kJ. For the biscuits/crackers category, total energy, weight and energy density were lower in the SFC. The energy density of biscuits and crackers sold in Australia typically ranges from 17 kJ/g to 21 kJ/g. Data from the WR suggest that children were bringing more energy dense biscuit types to school than we had allowed for. Therefore, we adjusted the energy per serve for biscuits/crackers to 247 kJ/serve based on a 12 g serve size and an energy density of 21 kJ/g. The total energy, weight and energy density of muesli and fruit bars were also lower in the SFC compared to the WR. In the original energy per serve calculation for this category, fruit bars (with a lower energy density) were weighted more heavily than muesli bars. In the WR however, children were much more likely to consume muesli bars. So, using an energy density value of 15 kJ/g that better reflected muesli bars and a serve size of 35 g (the WR and other data suggested that a serve size of 30 g was too low) we adjusted the energy per serve up to 524 kJ. There were also differences between the methods for fruit. A comparison of the serve size data suggested that we were under-estimating the average serve size of fruit by ~20g. Thus, we adjusted the average serve size to 160g. We also adjusted the energy per serve to 340 kJ to maintain an energy density of ~2.1 kJ/g. Finally, the WR data indicated that we were overestimating energy from fruit drinks so we reduced the energy per serve from fruit drinks and cordials to 400 kJ based on an ED of 1.6 kJ/g.

When analysing the WR we realised that a food category (sauces, chutney, pickles, and mayonnaise) had been omitted from the SFC. While only a few children had lunches containing these foods (total energy from this category was 716 kJ), we have added them as an ‘extras’ category to the revised SFC with a serve size of 10 g and energy per serve of 75 kJ. There were no other foods that we were unable to allocate to a food category. The revised instrument containing the amendments described is included as Appendix 1.

Inter-recorder reliability

Table 2 is a cross-tabulation of three categories of total number of serves per lunch box as reported by two recorders. The kappa statistic for overall agreement was 0.51 and agreement was good for small lunches and for large lunches. Agreement was poorer for medium sized lunches with recorder 2 either under- (21%) or over-coding (43%) compared with recorder 1. Our alternative method for assessing inter-recorder reliability was identifying the number of minor and major coding errors that occurred when two recorders coded the same lunches (Table 3). Overall, 74% of all food and beverage items (total *N* = 343 items) were coded identically by the two recorders. Of the coding errors that did occur, half of these were minor although this varied with the food category in question. Major errors were most likely to occur for beverages or sandwich fillings and minor errors for beverages, biscuits/crackers and the composite group of all other foods.

Discussion

The results of this study indicated that the SFC had good accuracy and reliability. Also, using the WR as our reference, we were able to improve our estimates of energy from breads, fat spreads, biscuits/crackers, muesli/ fruit bars, fruit and fruit drinks. Moreover, from the inter-recorder reliability tests, we identified that most of the errors of omission or addition occurred for beverages and sandwich fillings and that most of the serve size estimation errors occur for beverages and biscuits/ crackers. Use of the revised SFC and additional training for recorders on recording beverage, sandwich filling and biscuit/cracker information should improve the accuracy of the instrument.

The accuracy of the SFC was assessed by comparing estimated total energy against the same value derived from a weighed record reference. Overall, we found that the SFC method provided a good estimate of the total energy value derived by the WR method. Tertile classification of total energy values for the two methods was generally high. The Bland-Altman results indicated that overall the mean difference between methods was small and the limits of agreement sufficiently tight to suggest good agreement between the methods. This is especially true since dietary record data is invariably characterised by high inter-individual variability. Moreover, in our

Table 3. Inter-recorder coding errors for the school food checklist (n observations and percentages)*

	Same		Minor error		Major error		Total	
Breads	78	92.9%	4	4.8%	2	2.4%	84	100.0%
Sandwich fillings	68	73.1%	2	2.2%	23	24.7%	93	100.0%
Biscuits/crackers	21	61.8%	7	20.6%	6	17.6%	34	100.0%
All other foods	70	71.4%	22	22.4%	6	6.1%	98	100.0%
Beverages	16	47.1%	9	26.5%	9	26.5%	34	100.0%
Total all foods and beverages	253	73.8%	44	12.8%	46	13.4%	343	100.0%

* Same = identical coding by the two recorders; Minor error = entries varied by ≤ 1 serve or by food type; Major error = entries varied by > 1 serve or errors of omission, addition or misclassification.

view, the relative ease of recording food and beverage data using the SFC is much more practical and efficient than having to weigh and record each individual item.

In addition to the tertile classification and Bland-Altman test, the correlation coefficient obtained for total energy values derived by the two methods was also high (ie. r= 0.77). This comparatively high correlation between energy values determined by the two methods can be explained by a number of factors, including the relative similarity of the methods for estimating energy. For the SFC, energy was computed from checklist observations about the number of serves for various foods and beverages which were then multiplied by a standard energy value. The values for each food and beverage category were then summed to produce total energy. The weighed record method also relied on observation and recording of the foods, however, each food and beverage was weighed and energy values determined on the basis of actual weight. Other factors include the relatively narrow range of foods included on the SFC, the narrow range of foods available for consumption at school and the fact that serve sizes are generally well quantified in the school environment. Accuracy will also have been enhanced by using an independent assessor rather than child self-report. While children from 8 years of age and over self-report food intake reasonably well, having an independent interviewer complete the SFC is likely to reduce the error due to under-reporting that typically occurs with self-reports[10] and the error introduced when children have to recall intake.[11] Finally, many of the foods in children's lunchboxes are pre-packaged and Food Standards Australia New Zealand (FSANZ) requires that the average quantity be reported on the packaging.[12] The design of the SFC allows for this information to be recorded directly into the checklist.

Although the results demonstrate the accuracy of the SFC, they do not demonstrate validity. Willett and Lenart[13] have noted that in the absence of an absolute gold standard determination of the validity of a dietary assessment technique can only be based on comparison with a second technique – referred to as the 'validation standard'.[14] Where evaluation of instrument validity is proposed it is important that errors associated with the two methods are independent otherwise this will produce an exaggerated estimate of validity.[13] In the present study, as the two methods were similar (ie. observed, with energy computed on basis of actual amount vs observed, and energy computed on basis of estimated amount), errors were presumed to be correlated and thus we were unable to properly evaluate the validity of the SFC. However, we are mindful of the need for this work to be performed and intend to test the validity of the instrument in Australian children and also with other cultures. Another limiting factor was the small sample size. This limits the generalisability of the data and prevented us from calibrating categories of food where frequency of consumption was low, such as fast food or confectionary.

It is important to comment on the purpose and usefulness of the SFC. Firstly, it is not designed to be representative of usual individual intake. This would require multiple days of 24-hour measurement to capture day-to-day variability[15], and we only have one. Rather, it is designed to estimate children's average energy intake from foods and beverages available in a school setting. The instrument can also rank food and beverage categories based on their contribution to energy and determine the sources of these foods and beverages (home, school canteen or vending machine). Using this information, specific recommendations can be made on changes in the school food environment. Repeat measures will allow schools to measure progress on these recommendations over time and, where surveys are done in multiple schools, also provide cross-school comparisons. Alongside other indicators of physical activity and nutrition and other settings, the SFC could be used as a benchmarking or monitoring tool to directly inform policy makers at a school, state or national level.[16] In conclusion, we have shown that the SFC provides accurate estimates of energy and further has good inter-recorder reliability for assessing school food intake. The SFC is a simple and efficient method of accurately quantifying information about food available in the school environment.

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Appendix 1: School Food Checklist – Revised Instrument (SFC-R)

Deakin University
School Food Checklist

Child's name: ____________________
Pre/school: ____________________
[Information to be removed]

† Date: ☐☐-☐☐-☐☐ † Child ID Code: ☐☐☐☐
† DOB: ☐☐-☐☐-☐☐ † Yr/Grade (K/P/1-6): ☐ †Gender: M ☐ F ☐ ‡ Home for lunch: Y ☐ N ☐ ‡ Recorder's Initials: ☐☐

Food Category	*Description*	*1 serve equals*	Number of serves					Canteen or Vend Machine
			1	2	3	4	Other (s/mls/ gms)	✓
Bread / Roll	__ White __ Brown	2 Slices / 1 roll / ½ flat bread						650.00
Filling								
Meat etc	meat / seafood / egg	1 slice / layer = 30 g						170.25
Cheese		1 slice / layer = 20 g						322.00
Vegetable / Salad	2 different veg / salad	20 g						14.38
Peanut butter		Med spread = 20 g						496.0
Vegemite or Marmite		Thin spread = 5 g						41.50
Sweet spreads	Honey, jam, nutella, frosting	Med spread = 20 g						311.70
Extras	Sauces, chutney, pickles, mayonnaise	Med spread = 10g						75.00
Butter / Margarine		7g per slice of bread						196.00
Fast Food	Hot chips, pies /pasties/s rolls Hotdogs, hamburger, pizza Dim Sims, chicken nuggets	Bucket chips, pie/pastie, 2 slice pizza, plain hamburger 3 Dim Sims = 140g, 7 nuggets						1383.90
Leftovers / mixed dishes	Pasta, noodles (including packet), rice, meat or mixed dishes	160g						883.04
Noodles	2-min noodles Eaten dry	1 Packet = 65g						1132.95
Packaged snacks	Potato chips, corn chips pretzels, popcorn	Small snack pack = 25g						527.05
Biscuits & Crackers	Sweet, savoury or chocolate biscuits, rice cakes or other crackers	1 biscuit / 1 rice cake / 6 rice crackers = 12g LeSnack = 2 serves						247.00
Chocolate & Lollies		25g						410.10
Cheese, eggs, dried fruit, nuts	Egg, cheese, raisins, dried apricots, peanuts	½ an egg or 20g						283.04
Muesli & Fruit bars	Fruit sticks, muesli	1 bar = 35g						524.00
Cakes & Buns Muffins & Scones	Cakes, buns, slices, scone, muffin donuts, tarts	80g, 2 sm. Donuts, 2 tarts						1211.36
Pastries	Danish, Croissants	70 g						1223.25
Desserts	Icy poles, ice cream, dairy desserts	1 icy pole or ½ a dairy dessert = 90g						465.75
Yoghurt	Reduced fat (≤ 2%)? Y N	1 tub = 200g						751.22 640.00
Fruit	Apple, pear, banana, orange Sm. Stone fruit, kiwifruit, mandarin Fruit Snack Tub	1 piece = 160g 2 pieces = 160g 1 tub = 160g						340
Vegetables	Carrot sticks, celery sticks, broccoli	40g						28.76
Milk	Plain, flavoured milk Reduced fat (≤ 2%)? Y N	1 tetra-pack = 250ml						787.75 537.50
Soft drinks	Diet? Y N	1 can = 375 ml						726.75 7.50
Fruit juice, cordial	All fruit juices / cordials	1 tetra-pack / popper = 250ml						400.00
Water	Bottled water, mineral water	Equiv. to = 250ml						0.00

NB. Energy (kJ) value per serve for each food/beverage category are shown in the 'canteen/vending machine' column

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Original Article

Calibration and reliability of a school food checklist: a new tool for assessing school food and beverage consumption

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學校食物清單的校正與信度：一個評估學校食物與飲料的攝取新工具

澳洲及其他國家迫切需要發展一個能監測兒童肥胖及其相關行為與環境決定因素長期趨勢的系統。兒童在學校攝取的食物與飲料的熱量是一個兒童飲食型態的可用指標，我們發展了一份學校食物清單(SFC)去測量這些。SFC記錄20類食物及飲料的攝取份數及其來源(家裡、福利社、販賣機)。本研究旨在評估SFC的精確度，並與稱重紀錄(WR)比較，以校正SFC並評估記錄者間的信度。參與者為910名年齡在5至12歲，來自澳洲維多利亞鄉村城鎮的國小學童。WR的資料是收集自106名非隨機的子樣本；而第二個子樣本(n=46)則使用SFC測量受試者兩次的攝取量以此去評估紀錄者間信度。SFC及WR測量的平均熱量值分別為2992 KJ±924及3008 KJ ± 952，兩者有強的相關係數(皮爾森r=0.77)。WR與SFC之平均差異為15 KJ（95% CI，-107 KJ到138 KJ）及一致性區間（±2個標準差）為±1270 KJ。 SFC高 估麵包及果汁 飲料的熱 量/ 份數，並低估塗抹的脂肪、餅乾、堅果果乾穀物/水果棒及水果。記錄者間的信度良好（kappa 0.51）。 SFC被設計來 測量 學校中的 食物及 飲料的 熱量。其具有良好的精確度與信度，經過修改後的版本應可進一步改善工具的精確度。

關鍵字：飲食評估、學校、肥胖預防、小孩。