

# Objective assessment of compliance with a state-wide school food-service policy via menu audits

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## Abstract

**Objective:** The Healthy Food and Drink Policy was implemented in Western Australian government schools in 2007. The aim of the present study was to assess the compliance of Western Australian school canteen menus with the policy a decade after its introduction.

**Design:** The traffic-light system that underpins the Healthy Food and Drink Policy categorises foods and drinks into three groups: 'green' healthy items, 'amber' items that should be selected carefully and 'red' items that lack nutritional value. Canteen menus were collected online and each menu item was coded as a green, amber or red choice.

**Setting:** Western Australia.

**Participants:** Online canteen menus from 136 primary and secondary government schools.

**Results:** The majority of audited school menus met policy requirements to include  $\geq 60\%$  green items (84%) and  $\leq 40\%$  amber items (90%), but only 52% completely excluded red items. Overall, approximately half (48%) of school canteen menus met all three traffic-light targets. On average, 70% of the menu items were green, 28% were amber and 2% were red. Primary-school canteen menus were more likely than those from secondary schools to meet the requirements of the policy.

**Conclusions:** While the sampled Western Australian government school canteen menus were highly compliant with most of the requirements of the Healthy Food and Drink Policy, many offered red foods and/or drinks. Providing all schools with further education about identifying red items and offering additional services to secondary schools may help improve compliance rates.

**Keywords**  
Food policy  
Policy evaluation  
Canteen  
School  
Nutrition  
Menu audit

The importance of the school environment as a setting for promoting healthy eating behaviours during childhood is well recognised<sup>(1–3)</sup>. The school canteen in particular is a key intervention site as the provision of nutritious foods and drinks directly supports children's learning and development<sup>(4)</sup> and offers schools the opportunity to model the nutrition advice taught as part of the curriculum<sup>(5)</sup>. Schools can thus use the canteen to help deliver consistent messages to students about recommended eating practices to promote the adoption of lifelong healthy eating behaviours.

In recognition of the important role of school canteens in promoting healthy eating<sup>(6–9)</sup>, international agencies such as the World Cancer Research Fund International<sup>(10)</sup> and the WHO<sup>(11)</sup> have encouraged countries to implement nutrition policies that specify the foods and beverages that can and cannot be served in schools. In Australia, all states

and territories have implemented region-specific school food-service policies. The first of these was developed in New South Wales (NSW) in 2005, while the most recent was implemented in Tasmania in 2014<sup>(12)</sup>. The policies are mandatory for all government schools in each jurisdiction except Tasmania<sup>(13)</sup>. Policies in most regions use the traffic-light system that categorises foods and drinks into three groups: green, amber and red. 'Green' items are those that are based on the five core food groups (i.e. fruit, vegetables, grains, meat and vegetarian alternatives, dairy) and are recommended as everyday choices<sup>(4,14,15)</sup>. 'Amber' foods have some nutritional value, however they also contain moderate amounts of energy, total fat, saturated fat, sugar and/or sodium<sup>(14,15)</sup>. 'Red' items lack nutritional value and contribute excessive amounts of energy, total fat, saturated fat, sugar and/or sodium<sup>(14,15)</sup>. Specific nutrient cut-offs for each food and beverage

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category are used to determine the traffic-light categorisation of different items. The nutrient criteria underpinning the traffic-light system vary across the different jurisdictions of Australia, however they all share similarities and are consistent with the Australian Dietary Guidelines<sup>(4)</sup>.

Previous research suggests that the rate of adherence to canteen nutrition guidelines in Australia is generally poor<sup>(12,16)</sup>. A national audit of government school canteen menus collected in 2012 found that fewer than 35% of menus complied with traffic-light criteria in all Australian states and territories except Western Australia (WA), where the figure was substantially higher at 62%<sup>(16)</sup>. Of note is that the study compared the proportion of menu items in each traffic-light category against state/territory-based criteria, which are more stringent in WA than in other regions (e.g. WA school canteens are required to offer  $\geq 60\%$  green items while in other regions schools must have  $>50\%$  green items). The study also found that the mean proportion of green items on canteen menus was  $\leq 50\%$  in all regions except the Northern Territory, Queensland and WA<sup>(16)</sup>. In most states and territories, a substantial proportion of school canteen menus included confectionery (e.g. 47% of schools in the Australian Capital Territory and 38% in Tasmania)<sup>(17)</sup>.

Other research has found similar results, including three studies conducted in NSW in 2010<sup>(18)</sup>, 2012/13<sup>(17)</sup> and 2014<sup>(19)</sup> that observed that only 10%<sup>(17)</sup> to 22%<sup>(18)</sup> of school canteen menus excluded red items and only 29%<sup>(17)</sup> to 30%<sup>(19)</sup> of menus included  $\geq 50\%$  green items. These studies also found that NSW school canteen menus offered on average 35%<sup>(18)</sup> to 40%<sup>(17)</sup> green items and 6%<sup>(18)</sup> to 8%<sup>(17)</sup> red items. An audit of Victorian schools in 2008/09 (the Victorian school food-service policy was introduced in 2006) found that canteen menus included an average of 20% green items and 29% red items, no canteen menu had  $\geq 50\%$  green items, and only one school canteen menu (1%) avoided the use of red items<sup>(20)</sup>. Of the canteen menus included in the Victorian study, 20% were colour-coded and 36% of these items were coded correctly<sup>(20)</sup>. Both government and non-government schools were included in the studies conducted in NSW and Victoria discussed above; as canteen policies are not mandatory in non-government schools in these states, the study results are likely to underestimate compliance in government schools.

The mandatory WA Healthy Food and Drink Policy (the 'HFD policy' hereafter) was implemented in government schools in 2007 by the Department of Education WA<sup>(15)</sup>. A similar policy was mandated in WA Catholic schools in 2008<sup>(21)</sup>. Previous evaluation surveys conducted with school stakeholders in WA in 2008 and 2016 have suggested that WA schools are largely compliant with the HFD policy<sup>(22,23)</sup>. In 2008, 89% of respondents reported that their school achieved total or near-total compliance with the policy, while in 2016 this figure was 81%<sup>(23)</sup>.

These evaluations relied on self-reported measures of compliance and research has shown that there can be a substantial gap between self-reported compliance rates and compliance assessed using more objective measures<sup>(24,25)</sup>. For example, using self-reported measures, very high compliance ( $>80\%$ ) with state-based canteen policies has been shown in Queensland<sup>(26)</sup> and NSW<sup>(27)</sup>, while actual compliance appeared to be much lower ( $<30\%$ ) when independently reviewed via menu audits<sup>(16)</sup>.

The aim of the present study was to audit a sample of WA primary and secondary government school canteen online menus to provide an objective estimate of canteen menu compliance with the HFD policy to compare against the results of previous self-reported outcomes<sup>(22,23)</sup> and the 2012 national canteen menu audit study<sup>(16)</sup>. The present study provides a current estimate of canteen menu compliance in government schools in WA and provides detail on a number of additional compliance components compared with previous studies (points ii and iii below). Compliance was assessed in terms of: (i) the proportion of green, amber and red menu items; (ii) the extent and accuracy of menu colour-coding; and (iii) restrictions on the sale of amber savoury commercial items to  $\leq 2$  days per week. The presence or absence of desirable food and beverage items (plain water, plain milk, fruit and raw vegetables) was also recorded.

## Methods

### Setting and participants

A list of all WA schools ( $n$  1118) was obtained online in July 2017 from the Department of Education WA<sup>(28)</sup>. The list included information on school type (e.g. primary, secondary, combined primary/secondary), geographical location and whether schools were classified as government, Catholic or independent schools. Catholic and independent schools were excluded from the present study as the HFD policy has been implemented differently in Catholic schools and is not mandated in independent schools (308 Catholic and independent schools excluded). Remote community schools and schools catering for students with special educational needs (e.g. education support schools, agricultural schools and distance education schools) were also excluded as few operate canteens (125 schools excluded). This produced a list of 685 schools that were eligible to be included in the study.

Minimum thresholds were set according to the proportions of each school subtype that would be expected in a random sample of 100 menus based on the characteristics of the list of eligible schools. The thresholds for geographical location were sixty-three metropolitan schools and thirty-seven regional schools. The thresholds for school type were seventy-six primary schools, fifteen secondary schools and nine combined primary/secondary

schools. A random sample was drawn using these thresholds from the list of eligible schools. Not all schools had a menu available online and there were differences in the availability of online menus by school subgroup (primary schools and schools in the metropolitan area were more likely to have a menu available online, although these trends were not statistically significant). In total, 275 schools were randomly selected before all minimum thresholds were met, of which 145 (53%) had menus available online. Nine of these schools were excluded as their menus contained insufficient information for the analysis (e.g. did not include drinks or recess items), resulting in a final sample of 136 menus/schools (representing 17% of government schools in WA).

Canteen menus were collected online in September 2017 via schools' websites and Facebook pages administered by staff or the Parents and Citizens (P&C) Committee. The assumption was made that if the menu appeared online it was currently being used by the school canteen. Google searches were undertaken using the name of each school in combination with the keywords 'canteen', 'cafe', 'Facebook P&C' and 'Facebook canteen'. A manual search was also conducted of each available school website if no canteen menu was found using the previous search strategy. Where necessary, photographs posted on school and P&C Committee Facebook pages in 2017 were examined to identify any images of canteen menus. Where a menu was available on both Facebook and the school website, the most up-to-date menu was included in the data set (the majority of canteen menus accessed included a date of release).

### **Healthy Food and Drink Policy requirements**

To comply with the HFD policy, schools must ensure that only green and amber foods are provided in any school activities where the principal is directly responsible, including food provision in the canteen. The categorisation of foods and drinks into traffic-light categories is based on the nutrient criteria developed by the Federation of Canteens in Schools Inc., a national body that includes representatives from various state and territory canteen associations and governments<sup>(29)</sup>. The HFD policy specifies that canteen menus must offer  $\geq 60\%$  green items,  $\leq 40\%$  amber items and no red items. Canteens are also required to restrict the availability of amber savoury commercial products (e.g. chicken nuggets or pastries that meet amber nutrient criteria) to  $\leq 2$  days each week. Canteens are encouraged to colour-code their menu to allow parents and students to make informed decisions about their food choices. Schools are also given information about including desirable food and beverage items (plain water, plain milk, fruit and raw vegetables) during mandatory traffic-light training delivered by the Western Australian School Canteen Association (Inc.) (WASCA) and through various resources for canteens available via the

WASCA website<sup>(30)</sup>. Finally, government school principals must self-report on HFD policy compliance to the Department of Education WA annually.

### **Data coding**

The menus were coded by two qualified nutritionists from WASCA who have substantial experience in canteen menu assessment. A brief menu audit process was applied that involved analysing items as listed on the menu only, with no additional information collected from canteen staff or other school representatives. Reilly *et al.*<sup>(25)</sup> found that the brief menu audit approach was more accurate than a comprehensive menu audit that involved seeking clarifying information from canteen managers, while taking less than a quarter of the time to perform. Furthermore, brief menu audits have been shown to have a high level of agreement with the gold standard measure of canteen observations<sup>(25)</sup>.

Each item on the menu was coded as a green, amber or red choice according to the HFD policy traffic-light system as it stood in June 2017. Every food and drink option appearing on the menu was counted as a single item, including when an item was available only on some canteen operation days. Where multiple variations of an item were listed, such as different sandwich fillings, each was counted as an individual item. Due to the brief nature of the audit, several assumptions were made when categorising foods. These included that: (i) freshly prepared items met nutrient criteria; (ii) commercial food items (e.g. sausage roll or sushi) met the minimum nutrient criteria needed to be classified as amber or green choices<sup>(31)</sup>; and (iii) menu items used reduced-fat dairy, lean meats and reduced-salt ingredients where available.

Information on the number of days that each canteen operated was gathered from menus to permit assessment of the frequency with which amber savoury commercial products were offered for sale. Menus were recorded as being compliant with the HFD policy relating to the sale of these items (i.e. amber commercial products were available on  $\leq 2$  days per week), being non-compliant or not able to be assessed (due to not including information on the number of canteen operating days). Information on the presence of particular food and beverage items that have been nominated as especially desirable by WASCA, the WA Department of Health and the Department of Education WA was also collected as part of the study (plain water, plain milk, fruit and raw vegetables). If salad sandwiches, salad bowls/plates and/or vegetable sticks were offered for sale, the menu was recorded as incorporating raw vegetables. Each menu was categorised as either colour-coded or not, and data relating to the accuracy of colour-coding were captured.

### **Statistical methods**

The percentage of items in each traffic-light category was calculated by dividing the number of green, amber or red

items on the menu by the total number of menu items. Menus were classified as compliant with specific traffic-light requirements if they offered  $\geq 60\%$  green items,  $\leq 40\%$  amber items or excluded red items, respectively. Compliance with all three criteria was also determined. The accuracy of colour-coding was assessed by dividing the number of items classified correctly by the total number of menu items. Statistical analyses were performed using the statistical software package IBM SPSS Statistics version 23. To assess the representativeness of sampled school canteen menus, a  $\chi^2$  goodness-of-fit test was used to determine if the distribution of characteristics (i.e. school type and geographical location) differed between schools included in the analysis and schools for which a menu was sought. For the main analyses, between-group differences were assessed using the  $\chi^2$  test or Fisher's exact test (in the case of small sample sizes) for categorical variables and the Kruskal–Wallis test for continuous and ordinal variables. A *P* value of  $\leq 0.05$  was considered significant for all tests. The 95% CI around the means were calculated for the main outcome variables and are reported in the tables.

**Results**

**Sample characteristics**

In total, 136 (49% of schools for which a menu was sought) schools had a menu available online for analysis (Table 1). Most menus were obtained from school websites (*n* 130, 96%), with the remainder sourced from school Facebook pages. There were no significant differences in school type and geographical location between schools included in the analysis and the schools for which a menu was sought.

On average, canteens were open 4 days per week. Secondary-school canteens were open for significantly more days each week than primary-school canteens (5.0 *v.* 3.7 d; *P* < 0.001) and combined primary/secondary-school canteens (5.0 *v.* 3.7 d; *P* = 0.034). There was no difference in the number of canteen operating days between metropolitan and regional schools. The mean number of food and drink items appearing on menus was 56 items (range: 12–114).

**Table 1** Characteristics of schools with online canteen menus included in the sample, Western Australia, July 2017

	Menus sought		Menus included in analysis	
	<i>n</i>	%	<i>n</i>	%
Total schools	275	–	136	–
School type				
Primary	195	71	101	74
Secondary	51	19	25	18
Combined primary/secondary	29	11	10	7
School location				
Metropolitan	177	64	98	72
Regional	98	36	38	28

**Proportion of green, amber and red items**

On average, school canteen menus had a predominance of green items (70%), a moderate amount of amber items (28%) and a small proportion of red items (2%). Tables 2 and 3 show the average proportion of items and 95% CI in each traffic-light category by school type and location. The mean proportion of green items was significantly higher on primary-school canteen menus compared with secondary-school canteen menus (72 *v.* 64%; *P* < 0.001). Secondary-school menus had a higher proportion of red items compared with primary-school menus (6 *v.* 1%; *P* < 0.001) and combined primary/secondary-school menus (6 *v.* 1%; *P* = 0.008). There were no significant differences in the proportion of amber items according to school type (see Table 2), or in the proportion of green, amber and red items by location (see Table 3).

**Compliance with green, amber and red targets**

The HFD policy specifies that school canteen menus must offer  $\geq 60\%$  green items,  $\leq 40\%$  amber items and have no red items<sup>(15)</sup>. The majority of canteen menus included in the analysis had  $\geq 60\%$  green items (84%) and  $\leq 40\%$  amber items (90%), but only half (52%) excluded red items. However, the actual percentage of red items offered was low as described above. Overall, 48% of school canteen menus met all three traffic-light targets.

Primary-school canteen menus demonstrated higher levels of compliance than menus from other school types across individual traffic-light targets and in combination. Primary-school menus were more likely than secondary-school menus to provide  $\geq 60\%$  green items (89 *v.* 64%; *P* = 0.005), exclude red items (62 *v.* 8%; *P* < 0.001) and comply with all three traffic-light criteria (59 *v.* 4%; *P* < 0.001). Combined primary/secondary-school canteen menus were more likely than those from secondary schools to avoid the use of red items (50 *v.* 8%; *P* = 0.012) and comply with all three traffic-light criteria (40 *v.* 4%;

**Table 2** Proportions of green, amber and red items on online canteen menus (*n* 136) by school type, Western Australia, July 2017

Item/School type	Average		
	%	SD	95% CI
Green			
Primary	72 <sup>a</sup>	9.6	63.0, 80.5
Secondary	64 <sup>b</sup>	9.6	44.6, 82.4
Combined primary/secondary	70 <sup>a,b</sup>	10.4	41.5, 98.3
Amber			
Primary	27 <sup>a</sup>	8.7	18.3, 35.6
Secondary	30 <sup>a</sup>	8.5	12.3, 48.3
Combined primary/secondary	29 <sup>a</sup>	10.2	0.8, 57.0
Red			
Primary	1 <sup>a</sup>	2.2	–0.9, 3.5
Secondary	6 <sup>b</sup>	4.5	–3.3, 15.6
Combined primary/secondary	1 <sup>a</sup>	1.3	–5.5, 7.9

<sup>a,b</sup>Values within each colour category with unlike superscript letters were significantly different (*P* < 0.01).

**Table 3** Proportions of green, amber and red items on online canteen menus (*n* 136) by school location, Western Australia, July 2017

Item/School location	Average			<i>P</i> value
	%	SD	95% CI	
<b>Green</b>				
Metropolitan	70	9.9	60.9, 79.1	0.839
Regional	70	10.6	55.9, 84.9	
<b>Amber</b>				
Metropolitan	28	8.5	19.0, 36.7	0.819
Regional	27	9.7	13.2, 41.6	
<b>Red</b>				
Metropolitan	2	3.4	-0.7, 5.1	0.990
Regional	2	3.1	-2.5, 6.8	

*P*=0.017). There were no significant differences in compliance according to school location.

### Detailed summary of food and drink items classified as red featured on menus

As indicated above, a key area of non-compliance with the HFD policy was the inclusion of red items on canteen menus; 48% of menus offered at least one red item. Across the 136 menus analysed, 174 red items were identified. The mean number of red items included on all menus analysed was 1.3 items (range: 0–9 items). Taking into consideration only menus that included at least one red food or drink (*n* 65), the average number of red items included was 2.6 items (range: 1–9 items). Table 4 shows the breakdown of these items into food and drink categories. The most frequently included items were ice creams and icy poles classified as red (i.e. those not based on milk or >99% fruit juice, or those with a chocolate coating), certain types of drinks (e.g. flavoured water, juice in portions >250 ml or containing <99% juice, and iced tea products), jelly without fruit and crisps. Soft drinks and sports drinks were seldom listed, with only one occurrence of each across the audited menus. Confectionery (chocolate and lollies) accounted for just 2% (*n* 3) of all red items included on menus.

### Extent of colour-coding of menus

Fifty-four (40%) menus were colour-coded. Primary-school menus were more likely than secondary-school menus to be colour-coded (47 *v.* 16%; *P*=0.005). Presence of colour-coding did not differ significantly by school location.

There was a high degree of accuracy in traffic-light categorisation for those menus that were colour-coded. On average, 90% of items were coded correctly (range: 50–100%). Although still considered high, the accuracy of colour-coding was significantly lower on regional school menus compared with metropolitan school menus (84 *v.* 92%; *P*=0.04). There were no significant differences in the accuracy of colour-coding by school type.

**Table 4** Red food and drink items featuring on online canteen menus (*n* 65), Western Australia, July 2017

Red food and drink items*	<i>n</i>	%
Ice creams/icy poles	29	17
Flavoured water	24	14
Jelly (without fruit)	24	14
Crisps	22	13
<99% juice	19	11
Iced tea	15	9
Biscuits, sweet pastries & cakes	12	7
Juice > 250 ml	10	6
Milk drinks (coffee flavour, full-fat)	7	4
Sandwich ingredients (high-fat processed meat, sweet spreads e.g. jam)	6	3
Other	6	3

\*In total, 174 red food and drink items were identified from the 136 menus analysed.

### Additional menu requirements

As noted earlier, in addition to requirements for the proportion of green, amber and red items offered for sale, school canteens are expected to meet additional menu requirements. The majority of canteen menus included in the analysis met these requirements: 99% incorporated raw vegetables, 91% had fruit available, 87% included plain water, 77% restricted the availability of amber savoury items to ≤2 days per week, and 61% offered plain milk. In terms of the provision of raw vegetables, 99% of canteen menus included a salad sandwich, 79% offered a salad bowl or plate, and 36% offered vegetable sticks.

Between-group differences in meeting these menu requirements were observed, with secondary-school canteen menus less likely to restrict the availability of amber savoury items to ≤2 days per week than primary-school canteen menus (50 *v.* 81%; *P*=0.003) and combined primary/secondary-school menus (50 *v.* 100%; *P*=0.006). Primary-school menus were also more likely than secondary-school menus to include plain milk (67 *v.* 40%; *P*=0.012). A higher proportion of primary-school menus included fruit for sale compared with combined primary/secondary-school menus (94 *v.* 70%; *P*=0.034). As almost all menus in the main analysis included salad sandwiches, between-group differences were assessed only for having a salad bowl/plate or vegetable sticks available for purchase. Primary-school canteen menus were more likely than secondary-school menus to include vegetable sticks (42 *v.* 12%; *P*=0.006). No significant differences were observed in meeting the additional menu requirements by school location.

### Discussion

The majority of WA school menus included in the present analysis were meeting HFD policy requirements relating to the minimum proportion of green items and maximum proportion of amber items they are allowed to include. Of particular interest in the analysis is that, on average, 70% of the foods and drinks appearing on canteen menus were

green items, which far exceeds the 60% needed to be compliant with the HFD policy. While the proportion of menus completely excluding red items was lower, the actual number of red items that appeared was small. Food and drink items that are clearly identifiable as red choices, such as soft drinks and lollies, seldom appeared on canteen menus. The types of red items that did appear (such as non-compliant ice creams, icy poles, flavoured water and juices) are items that canteen staff may find difficult to categorise into the appropriate traffic-light category. This suggests that offering additional education about the traffic-light categorisation of these items or expanding the online nutrition database that classifies green and amber foods and drinks<sup>(32)</sup> has the potential to markedly improve overall compliance with the policy.

The present study found that 48% of menus met all traffic-light targets. These results can be compared with the 2016 evaluation of the HFD policy that used self-reported compliance measures. In 2016, 81% of school principals indicated that their school achieved total or near-total compliance with the policy<sup>(23)</sup>. The difference in results may reflect the samples included in each analysis (the present study included a higher proportion of respondents from metropolitan schools than the 2016 evaluation) and the different methodologies used. In addition, as noted above, school representatives may not always be able to classify food and drink items into the correct traffic-light category<sup>(33)</sup>, which may lead to errors in their self-reported compliance with the HFD policy requirements. It is worth noting that the WA Government currently assesses school compliance with the HFD policy annually via principal self-report. It is apparent that self-report may not be a sufficiently accurate measure of compliance and governments should consider moving towards more robust ongoing monitoring criteria.

The results of the present study can also be compared with the national canteen menu audit conducted in 2014 (menus collected online in 2012), which found that 62% of WA school menus adhered to the HFD policy guidelines in terms of including a minimum of 60% green items and excluding the use of red items<sup>(16)</sup>. This is higher than the 48% compliance with traffic-light targets found in the current analysis. The smaller sample size in the Woods *et al.*<sup>(16)</sup> study (forty-two schools from WA) and the focus only on green and red traffic-light targets (i.e. not including the requirement to have  $\leq 40\%$  amber menu items) in the Woods *et al.*<sup>(16)</sup> study may provide some explanation for the different results found. There were also changes made to the categorisation of items into traffic-light categories in WA in 2013 that may account for the higher rate of compliance with the HFD policy observed in the Woods *et al.*<sup>(16)</sup> study compared with the present study. Changes included the re-categorisation of flavoured waters,  $<99\%$  juices, juice in portion sizes  $>250$  ml and icy poles based on  $<99\%$  juice from amber to red. Therefore, many of the red items identified on canteen menus in the present study

would have been categorised as amber items in 2012 when the previous WA menu audit was conducted<sup>(16)</sup>. The difference in results found between the 2012 menu audit and the present study highlights the need to effectively communicate policy changes to enable schools to achieve compliance.

The present study found that secondary-school menus were less likely than primary-school menus to meet the requirements of the HFD policy across multiple aspects of compliance. This is consistent with the findings from the 2016 evaluation of the HFD policy<sup>(23)</sup> and with other research conducted across different regions in Australia that has found secondary schools to be less compliant with canteen policies compared with primary schools<sup>(16,20)</sup>. The lower compliance of secondary schools with the requirement to restrict amber savoury commercial products to  $\leq 2$  days per week may in part be explained by the larger number of primary and combined primary/secondary schools compared with secondary schools that were open for  $\leq 2$  days each week, which meant they were automatically compliant. Secondary schools may also face particular barriers that impact on the healthfulness of foods and drinks offered by the canteen. For example, lower engagement of parents with the P&C Committee can mean there are fewer volunteer workers available to prepare meals, which can result in a reliance on amber 'heat-and-serve' commercial products<sup>(34)</sup>. School stakeholders may have a perception that adolescents demand unhealthy menu items to a greater extent than students of primary-school age, and canteens can feel pressured to offer these options<sup>(33,34)</sup>. Education and support initiatives that address the unique barriers faced by secondary schools may help address the lower rates of secondary-school compliance with the HFD policy.

As discussed in the introduction, the rate of adherence to canteen nutrition guidelines is low in the majority of Australian states and territories<sup>(12,16)</sup>. In contrast, the results of the present study indicate that WA schools are on average exceeding the guidelines relating to the provision of green foods and drinks and the majority are not providing red items. There are several factors that may explain why compliance with canteen nutrition guidelines appears to be much higher in WA compared with other Australian states and territories. WA is the only state to set clear targets on the proportion of menu items that may be offered in each traffic-light category rather than using qualitative descriptions such as 'majority to be green'<sup>(12)</sup>. The target of 60% green is also higher compared with other states and territories ('majority green' suggests  $>50\%$  green). WA schools are not permitted to sell red foods at all, whereas some states and territories permit the sale of red foods twice per term. WA schools are also required to restrict the availability of amber savoury commercial products to  $\leq 2$  days each week. These stringent and quantifiable targets have been in place for over a decade, indicating that setting a clear expectation to school

canteens about the foods and drinks they should provide actually improves compliance, despite the need for schools to reach more stringent targets overall.

### **Limitations and strengths**

Several limitations should be considered when interpreting the present study's findings. First, the study included only a small proportion of government schools in WA (17%), so the results are not necessarily generalisable to all WA government schools and may not be generalisable to Catholic or independent schools. Second, many schools in WA (particularly regional schools) do not have a canteen but may instead run other food-related initiatives such as a school breakfast club or lunch programme. While these programmes are still expected to comply with the HFD policy, it was outside the scope of the current evaluation to assess compliance in these settings. Additionally, the present study evaluated only the canteen-related components of compliance and did not assess adherence to other aspects of the HFD policy such as avoiding the provision of red foods to students at school events and in class.

Third, the menus included in the present analysis were sourced online. Not all schools with a canteen have a website or Facebook page, and those with an online presence may not have their menu available for download. Although there were no significant differences by school type and geographical location between schools included in the analysis and all schools for which a menu was sought, it is possible that there were systematic differences in other school characteristics that were not included in the analysis. Unpublished data from WASCA indicate that in 2013, 75% of government schools had a canteen. This differs from the 48% of the searched government schools for which an online canteen menu could be located. Schools that have menus freely available online may be those that are more compliant with the HFD policy and therefore the results of the study may overestimate true compliance with the policy. Future research in this area should look to use additional strategies to increase the sample of menus included in the analysis, such as by contacting schools and asking them to submit menus.

Fourth, schools could have failed to include on their menus the full range of items offered for sale. For example, additional recess items may be available at the point of sale or a wider range of drinks may be offered than included on the menu. As schools are aware that they are being monitored for their compliance with the policy, the foods and drinks least likely to be listed on the menu are those that are unhealthy, which may mean that the true proportion of red items on WA canteen menus has been underestimated.

The major strength of the present study was the methodology used to assess school canteen compliance with the HFD policy. Canteen menu audits have been found to

be an accurate method of assessing canteen compliance with healthy food and drink policies, particularly when compared with self-report measures<sup>(25)</sup>. Self-report measures may be subject to a social desirability bias, which is the tendency for respondents to give answers they believe the researcher desires<sup>(35)</sup>. Collecting menus online may have reduced the impact of selection bias<sup>(36)</sup>, thus potentially explaining some of the difference between the audit results and the outcomes of previous self-report surveys<sup>(22,23)</sup>. School representatives who choose to complete and return a voluntary survey documenting their school's compliance with the HFD policy are likely to have a greater interest in health and nutrition and a stronger motivation to follow the policy compared with those who choose not to participate in such a survey.

### **Conclusions**

The present study found a sample of WA government school menus to be highly compliant with the requirements of the HFD policy to include  $\geq 60\%$  green items and  $\leq 40\%$  amber items. While a large proportion of menus included red items, the actual number of red items identified was very low. Providing schools with specific guidance about the categorisation of red items commonly appearing on canteen menus thus has the potential to dramatically improve compliance rates. Given the lower adherence of secondary-school canteen menus to the HFD policy across multiple aspects of compliance, secondary schools may need to be provided with additional resources and services that take account of the unique barriers they face compared with other school settings.

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