




# Towards healthier food choices for hospital staff and visitors: impacts of a healthy food and drink policy implemented at scale in Australia

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## Abstract

**Objective:** To determine the impact of a healthy food and drink policy on hospital staff and visitors' food purchasing behaviours, and their awareness and support for the changes introduced.

**Design:** Two repeated cross-sectional surveys, consisting of intercept interviews and observations of food items purchased, were conducted before (March–July 2018) and after (April–June 2019) the target date for implementation of thirteen food and drink practices (31 December 2018). Food purchases were coded as 'Everyday' (healthy) or 'Occasional' (unhealthy).

**Setting:** Ten randomly selected New South Wales public hospitals, collection sites including hospital entrances and thirteen hospital cafés/cafeterias.

**Participants:** Surveys were completed by 4808 hospital staff and visitors (response rate 85%). The majority were female (63%), spoke English at home (85%) and just over half had completed tertiary education (55%).

**Results:** Significant increases from before to after the implementation target date were found for policy awareness (23 to 42%;  $P < 0.0001$ ) and support (89 to 92%;  $P = 0.01$ ). The proportion of 'Everyday' food purchases increased, but not significantly (56 to 59%;  $P = 0.22$ ); with significant heterogeneity between outlets ( $P = 0.0008$ ). Overall, younger, non-tertiary-educated adults, visitors and those that spoke English at home were significantly less likely to purchase 'Everyday' food items. Support was also significantly lower in males.

**Conclusions:** The findings provide evidence of strong policy support, an increasing awareness of related changes and a trend towards increased 'Everyday' food purchasing. Given the relatively early phase of policy implementation, and the complexity of individual food purchasing decisions, longer-term follow-up of purchasing behaviour is recommended following ongoing implementation efforts.

**Keywords**  
Health policy  
Healthy environments  
Nutrition  
Obesity

Overweight and obesity levels in Australia continue to increase, with more than two-thirds of Australian adults above a healthy weight<sup>(1)</sup>. More than one-third (35%) of the average Australian's total daily energy intake comes from discretionary (energy-dense, nutrient-poor) foods<sup>(2,3)</sup>. The widespread availability and promotion of unhealthy food and drink in our environment is a major contributor to unhealthy diets, leading to poor health outcomes<sup>(4)</sup>. Among other factors, retail food environments play an important role in food purchasing decisions and have the potential to impact positively on food purchasing and eating

behaviours<sup>(5,6)</sup>. Policies that engage retailers to improve the availability and acceptability of healthier food and drink options have been recommended as a strategy in obesity prevention<sup>(7)</sup>.

During the last decade, an increasing number of interventions to improve the retail food environment in public institutions such as schools, worksites and health facilities have demonstrated positive impacts on consumer acceptability, healthier food and drink product availability, purchasing behaviour and consumption<sup>(8–15)</sup>. Policy approaches targeting the retail food environment in the hospital setting are

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particularly pertinent, being recognised as role models for health-promoting environments, and having the potential for broad and sustainable reach through their staff, patients and community, particularly if implemented at scale<sup>(8,10,12)</sup>. Much of the evidence demonstrating positive impacts of at-scale healthy food environment policies draws on studies conducted in the school setting<sup>(13,16)</sup>. There is promising international evidence that such policies in the hospital setting can improve the availability of healthy foods<sup>(10,17)</sup>, and small-scale Australian interventions have demonstrated positive impacts on purchasing behaviour<sup>(8,9)</sup>. There is limited evidence of the impacts of policies in this setting, particularly at scale, on food purchasing behaviour and the differential impacts for sociodemographic groups.

In June 2017, the New South Wales (NSW) Ministry of Health introduced a state-wide policy, known as *The Healthy Food and Drink in NSW Health Facilities for Staff and Visitors Framework* (hereafter referred to as the *Framework*)<sup>(18)</sup>, to provide a healthy food and drink environment for staff and visitors in all health facilities. These included public hospitals, community health centres, rehabilitation centres and offices managed by NSW Health. The *Framework* provides a model for a healthy food environment and is part of a comprehensive long-term approach to obesity prevention in NSW that involves coordinated action across settings and sectors to support healthy eating and active living through environmental change, support programs, routine service delivery and education initiatives<sup>(19)</sup>.

Introduction of the *Framework* provided a unique opportunity to investigate the impact of a food environment intervention delivered at scale in hospital retail outlets across NSW. The aim of the study was to examine changes in hospital staff and visitor policy awareness, support and food purchasing behaviours following the introduction of the *Framework*. We also assessed the reasons for supporting or opposing the policy and any differences in awareness, support and purchasing behaviours across sociodemographic groups.

### **Policy intervention**

The *Framework* is based on the Australian Dietary Guidelines<sup>(20)</sup> and provides a set of best practice guidelines, that aim to increase the availability and promotion of healthy food and drink options in commercial and volunteer retail food outlets in NSW Health facilities. The *Framework* includes practices that reflect the 'Food and Drink Benchmark', which covers product availability, product quality, product size and marketing. The ultimate goal is to increase the availability of healthy food and drink options ('Everyday') to staff and visitors, and decrease the availability of unhealthy food and drink ('Occasional'), including the removal of sugar-sweetened beverages (SSB) from sale. The *Framework* applies to food outlets where foods and drink are available to staff and visitors

in NSW health facilities. The first target as outlined in the *Framework* was the removal of pre-packaged SSB from sale by 31 December 2017, which was largely achieved<sup>(21)</sup>. The second target was to achieve all other fifty-three *Framework* practices by 31 December 2018. The timeline and targets were revised in April 2018 to include the sustained removal of SSB and implementation of twelve additional practices that were illustrative of the 'Food and Drink Benchmark' by 31 December 2018 (Supplementary Appendix). Implementation of the *Framework* is continuing across NSW with support from the NSW Ministry of Health, who is undertaking a comprehensive evaluation to assess the effectiveness of the *Framework*, understand the pattern of impacts on stakeholders, discern the policy acceptability, feasibility and sustainability and understand the implementation process. This study forms one part of the evaluation.

### **Methods**

Two repeated cross-sectional surveys, consisting of intercept interviews with hospital staff and visitors in ten randomly selected NSW public hospitals, were conducted before and after the target date for implementation of the twelve healthy food and drink practices (31 December 2018). Data were collected during March–May 2018 (with the exception of one hospital in July 2018) and during April–June 2019. Hospitals were randomly selected for inclusion using probability proportional to size sampling to ensure that larger hospitals with one or more cafés had a higher chance of selection. Hospital size was determined using admitted patient data (April–June 2017)<sup>(22)</sup>.

An independent market research company was commissioned by the NSW Ministry of Health to conduct the intercept interviews with consenting staff and visitors at hospital entrances and thirteen cafés or cafeterias within the ten hospitals and their interviewers were trained by the primary researcher (LC). Interviews were conducted by paired interviewers over 2–4 weekdays in each hospital, during a 6-h window each day between 8 am and 3 pm, and within a 1-week period, equating to between 12 and 24 h of interview time per hospital per data collection period. Interviewers attempted to capture as many eligible participants as possible during this time. Hospital inpatients, those younger than 18 years and those who had already participated during the same data collection period, were excluded. Interviewers recorded responses on an electronic tablet and interviews lasted for 5–10 min. Data collection instruments included an interviewer-administered questionnaire and an additional pilot-tested observational recording of food items purchased, for participants recruited in the café/cafeteria sites. Café/cafeteria customers were eligible if they had purchased food or cold drink items within the outlet and were approached just after they completed their purchase, however, this study reports on food purchases only. Data on drinks purchased was analysed separately and has been published previously<sup>(21)</sup>.



All consenting participants were asked the same questions, and café/cafeteria customers were also asked whether they would consent to their food purchases being observed and recorded. Consenting participants were asked whether they were aware that from 1st January 2019, NSW Health required all public hospitals in NSW to offer more healthy foods and fewer unhealthy foods for sale, whether they supported this action and their main reason for supporting or not supporting. Open-ended responses for reasons were inductively coded for descriptive analysis. Participants were asked whether they had worked in or visited this hospital at some time during the last year, and if so, whether they: had noticed a change in the foods offered; had noticed more/fewer/the same number of healthy foods for sale; were more/less/just as likely to purchase foods outside (but nearby) the hospital compared to the previous year (displacement); and had changed the type of food they usually purchased from within the hospital compared to the previous year (substitution), and the reason. Sociodemographic data included age, sex, staff/visitor status, education level and language spoken at home. For café/cafeteria customers, interviewers observed and recorded the type and brand, if applicable, of food items purchased. Food data were coded as 'Everyday' (healthy) or 'Occasional' (unhealthy/discretionary) based on *Framework* criteria and aligned with the concepts of core and discretionary foods in the Australian Dietary Guidelines<sup>(20)</sup>. They were also coded as either a hot or cold meal item, or a snack. Examples of 'Everyday' meal items included pasta, rice, roast or grilled meats, vegetables and salads; and 'Occasional' meal items included hot chips, fried potato products, processed and deep-fried meats.

Counts and weighted proportions were calculated to compare participant's sociodemographic characteristics, and estimates of substitution and displacement in 2018 and 2019. The difference in each outcome (awareness of the requirement for NSW health facilities to offer more healthy foods and fewer unhealthy foods, support for this requirement and 'Everyday' food item purchasing behaviour) in 2018 and 2019 were compared using weighted proportions and  $\chi^2$  tests. All analyses accounted for the probability of selection and clustering by hospital. Furthermore, consistency of the ORs for policy awareness, support and purchasing 'Everyday' *v.* 'Occasional' food in 2018 *v.* 2019 across the food and drink outlets were examined using the Breslow–Day test for homogeneity. Mixed effects logistic regression analyses explored differences in each outcome in 2019 relative to 2018, while controlling for sociodemographic characteristics. Mixed models included hospital as a random factor to account for the clustering within hospitals and were weighted for the unequal probability of selection at the hospital level. All statistical tests were two-sided and the type I error rate was 5%. Data were cleaned and analysed using SAS software, Version 9.4. (SAS Institute, Inc.).

## Results

Of 6048 staff and visitors approached, 5664 (94 %) were eligible and of those 4808 (85 %) consented to participate and completed the survey (85.5 % in 2018; 84.3 % in 2019). The majority were female (63 %), spoke English at home (85 %), and just over half had completed tertiary education (55 %) (Table 1). There was fairly equal representation of younger, middle-aged and older adult age groups and of staff compared to visitors.

### ***Awareness of and support for the change requiring NSW health facilities to offer more healthy foods and fewer unhealthy foods***

The likelihood of policy awareness, after adjusting for sociodemographic factors, was significantly higher in 2019 ( $n$  1115; 46.3 %; 95 % CI 40.7, 51.9) relative to 2018 ( $n$  535; 22.5 %; 95 % CI 18.7, 26.2) (Table 2). The adjusted odds of policy awareness were: 64 % lower in visitors relative to staff; 27 % lower in males relative to females; 49 % lower in those 18–34 years and 20 % lower in those 35–54 years, relative to older (55+ years) respondents. Also, more than half of participants in 2019 had noticed more healthy food items for sale, increasing significantly from 2018 (53.1 *v.* 40.6 %;  $P=0.02$ ). The likelihood of policy awareness in 2019 compared to 2018 varied substantially by hospital (Breslow–Day test  $P=0.0018$ ).

There was strong policy support in both 2018 ( $n$  2138; 89.1 %; 95 % CI 87.6, 90.5) and 2019 ( $n$  2215; 91.8 %; 95 % CI 89.9, 93.7), which increased significantly over this period, after adjusting for sociodemographic factors (Table 2). The adjusted odds of policy support were: 18 % lower in males relative to females; 42 % lower in non-tertiary educated compared to tertiary educated and 44 % higher in those that spoke a language other than English at home relative to English speaking. There was a significant interaction between age group and education level ( $P<0.0001$ ), where non-tertiary educated participants of all age groups and 35–54-year-old tertiary-educated participants were significantly less likely to support the policy than tertiary-educated older adults (55+) (Fig. 1).

Of the 4353 participants who supported increasing the proportion of healthy foods available for sale in 2018 or 2019, the majority ( $n$  3410; 78.3 %) cited health reasons for their support. Of the 277 participants who did not support increasing the proportion of healthy foods available for sale, the majority cited restriction of free choice as the reason ( $n$  236; 85.2 %).

### ***Observed food items purchased***

A total of 3551 purchased food items were observed (2018:  $n$  1856; 2019:  $n$  1695), purchased by 2500 participants (2018:  $n$  1265; 2019:  $n$  1235). The most frequently observed food purchases in both years were sandwiches with 'Everyday' fillings (2018:  $n$  203; 13.3 % (95 % CI 6.2, 20.5);

**Table 1** Sociodemographic characteristics of respondents

Characteristic	2018 (n 2394)		2019 (n 2414)		Total (n 4808)	
	n	%*	n	%*	n	%*
Female	1523	63.7	1466	61.8	2989	62.8
Age group (years)						
18–34	766	32.6	790	32.8	1556	32.7
35–54	900	37.8	909	37.9	1809	37.9
55+	728	29.5	715	29.4	1443	29.4
Staff	1173	49.6	1140	47.0	2313	48.3
Spoke a language other than English at home	381	16.7	322	14.2	703	15.4
Tertiary† education	1331	57.1	1275	53.1	2606	55.1

Total respondents for staff/visitor status = 4805 and education = 4791.

\*Weighted to probability of hospital selection.

†University degree.

2019: *n* 248; 19.0% (95% CI 8.9, 29.1)), hot chips and other fried potato products (2018: *n* 203; 14.7% (95% CI 12.8, 16.5); 2019: *n* 173; 14.4% (95% CI 10.0, 18.8)) and pasta/rice dishes (2018: *n* 162; 12.3% (95% CI 9.4, 15.1); 2019: *n* 127; 11.7% (95% CI 5.9, 17.5)).

There was an increase in the proportion of 'Everyday' food purchases from 2018 (56.3%; 95% CI 51.8, 60.8) to 2019 (59.2%; 95% CI 52.6, 65.8), yet this was not statistically significant, after adjusting for sociodemographic factors (Table 2). Similarly, non-significant increases were found within each food category: 'Everyday' hot meal items (2018 (55.9%; 95% CI 52.7, 59.2) *v.* 2019 (57.4%; 95% CI 52.0, 62.7); adjusted OR 1.12 (95% CI 0.85, 1.46); *P* = 0.425); 'Everyday' cold meal items (2018 (85.3%; 95% CI 80.9, 89.7) *v.* 2019 (91.6%; 95% CI 85.4, 97.8); adjusted OR 1.90 (95% CI 0.94, 3.84); *P* = 0.075); and 'Everyday' snack items (2018 (36.0%; 95% CI 20.3, 51.8) *v.* 2019 (40.0% (95% CI 32.1, 47.9); adjusted OR 1.23 (95% CI 0.69, 2.21); *P* = 0.481)). The likelihood of having 'Everyday' food items purchased in 2019 compared to 2018 varied substantially by outlet (Breslow–Day test *P* = 0.0008).

The adjusted odds of purchasing 'Everyday' food items were: 22% lower in visitors relative to staff; 29% lower in younger adults (18–34) relative to older (55+); 29% lower in non-tertiary educated relative to tertiary-educated and 52% higher in those that spoke a language other than English at home relative to English speaking. There was a significant interaction between age group and education level (*P* = 0.005), with non-tertiary-educated participants significantly less likely to purchase 'Everyday' foods than tertiary-educated among younger age groups only (Fig. 1).

### Substitution and displacement of food purchasing

Less than one quarter (*n* 240; 23.6%; (95% CI 16.1, 31.1)) of participants, who reported they had worked in or visited the hospital during the previous year (*n* 1040), said they had changed the type of food they usually bought within the hospital compared to 2018 (substitution). Almost half of these cited reasons most likely related to the

intervention: that there were now healthier foods or meals available (*n* 90; 34.3%); the food they used to buy was no longer sold (*n* 37; 14.7%). Other commonly cited reasons were that they were trying to have a healthier diet (*n* 52, 20.7%), and the food was now better quality (*n* 23; 8.3%). Females were significantly more likely to report changing their food purchases within the hospital than males (25.6 *v.* 19.5%;  $\chi^2 = 10.5$ ; *P* = 0.0012).

Less than one quarter (*n* 221; 22.7%; (95% CI 14.8, 30.6)) of participants who reported they had worked in or visited the hospital during the previous year (*n* 1040), reported they were more likely to buy food from nearby places outside the hospital compared to 2018 (displacement). This was similar to the proportion that were less likely (in 2019 compared to 2018) to buy food from nearby places outside the hospital (*n* 182; 17.0%; (95% CI 9.6, 24.4)). It was also similar to the proportion of 2018 survey participants that reported they were more likely, compared to the previous year (prior to *Framework* introduction), to buy food from nearby places outside the hospital (*n* 222; 19.7%; (95% CI 10.8, 28.6)). There were no statistically significant differences in the displacement of food purchases for any of the sociodemographic characteristics.

### Discussion

This is one of the first evaluations of an at-scale policy intervention targeting the food environment in health facilities, to assess changes in staff and visitor's levels of awareness, support and food purchasing behaviours, and the differences amongst sociodemographic groups. The findings are promising, showing that consumers are increasingly aware of the changes introduced under the *Framework*, and that they are well supported by both staff and visitors in NSW hospitals, consistent with our previous study examining the removal of SSB in this setting<sup>(21)</sup>. The level of support found for offering more healthy and fewer unhealthy foods for sale was higher than for removing SSB, in these facilities<sup>(21)</sup> and other hospital food outlets<sup>(23)</sup>, and for increasing the price of SSB<sup>(24)</sup>.



**Table 2** Adjusted OR (AOR) and 95 % CI for the likelihood of being aware of the policy intervention\*, supportive and having purchased an ‘Everyday’ food item

Sociodemographic characteristics	Aware of policy intervention*					Supportive of policy intervention*					Everyday food item purchased				
	<i>n</i>	%†	AOR	95 % CI	<i>P</i> -value	<i>n</i>	%†	AOR	95 % CI	<i>P</i> -value	<i>n</i>	%†	AOR	95 % CI	<i>P</i> -value
<b>Year</b>															
2018 (ref)	535	22.5				2138	89.1				1037	56.3			
2019	1115	46.3	3.41	2.54, 4.58	<b>&lt;0.0001</b>	2215	91.8	1.43	1.09, 1.89	<b>0.01</b>	996	59.2	1.18	0.91, 1.53	0.22
<b>Staff/visitor</b>															
Staff (ref)	1007	43.9				2114	91.1				1071	61.5			
Visitor	642	25.7	0.37	0.31, 0.43	<b>&lt;0.0001</b>	2236	89.8	0.98	0.86, 1.11	0.76	961	53.9	0.77	0.64, 0.92	<b>0.005</b>
<b>Sex</b>															
Female (ref)	1098	37.0				2727	91.1				1189	56.7			
Male	552	30.3	0.73	0.64, 0.83	<b>&lt;0.0001</b>	1626	89.3	0.83	0.73, 0.95	<b>0.0076</b>	844	59.2	1.06	0.92, 1.23	0.42
<b>Age group (years)</b>															
55+ (ref)	532	37.3				1302	90.5				589	58.9			
35–54	651	36.4	0.80	0.72, 0.90		1639	90.4	0.85	0.67, 1.06		795	59.3	0.88	0.70, 1.10	
18–34	467	29.8	0.51	0.41, 0.62	<b>&lt;0.0001</b>	1412	90.5	0.86	0.64, 1.14	0.31	649	54.9	0.70	0.55, 0.89	<b>0.0005</b>
<b>Education</b>															
Tertiary‡ (ref)	935	36.0				2423	92.8				1215	62.0			
Non-tertiary	707	32.5	0.96	0.82, 1.11	0.55	1916	87.7	0.54	0.45, 0.65	<b>&lt;0.0001</b>	813	52.0	0.71	0.63, 0.80	<b>&lt;0.0001</b>
<b>Language spoken at home</b>															
English (ref)	1437	35.6				3702	90.1				1681	56.5			
Language other than English	213	28.6	0.81	0.65, 1.02	0.07	651	92.5	1.28	1.18, 1.40	<b>&lt;0.0001</b>	352	64.0	1.49	1.23, 1.80	<b>&lt;0.0001</b>

ref, reference group.

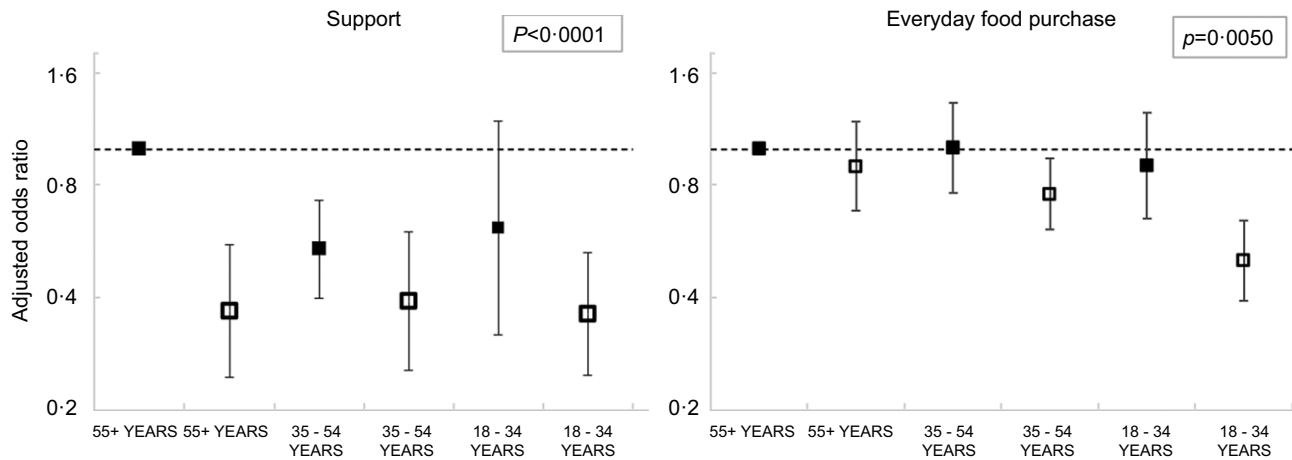
\*The requirement for NSW hospitals to offer more healthy and fewer unhealthy foods for sale.

†Weighted to probability of hospital selection; *P*-values < 0.05 indicated in bold.

‡University degree.

Significant difference between groups are indicated in bold; there was significant variation between hospitals for awareness (random intercept sd 0.42; *P*= 0.003) and between hospital outlets for everyday food items purchased (random intercept sd 0.50; *P*= 0.0001).





**Fig. 1** Interaction between age group and education level for supporting the policy and for ‘Everyday’ food purchasing behaviour. ■, Tertiary educated; □, non-tertiary educated

Being female, from an older age group, having a higher education level and speaking a language other than English were associated with higher policy support or healthier in-hospital food purchasing behaviour in this study. Many of these sociodemographic factors have been previously associated with healthier dietary behaviours in the Australian population<sup>(3,25–27)</sup>. Conversely, males, younger adults and those born in Australia tend to consume more ‘discretionary’ (‘Occasional’) foods and less vegetables and fruits than females, older adults and those born overseas<sup>(3,25,27)</sup>. Males and younger adults also tend to be less likely to support government policy interventions perceived as restricting individual choice or behaviour, particularly for those engaged in the targeted behaviour<sup>(28)</sup>. Although only a small proportion did not support the policy, further exploration of core values and beliefs held by males, younger and Australian-born adults related to obesity prevention initiatives, and the role of government could inform targeted, supportive communication efforts<sup>(28)</sup>.

Non-tertiary educated Australians also typically consume less healthy and varied diets than tertiary-educated, and are thought to be more likely to maintain their usual food choices and less receptive to novel, healthier foods<sup>(26,29)</sup>. We similarly found that hospital staff and visitors

with non-tertiary education were less likely to purchase ‘Everyday’ foods after the target for implementation of the twelve food and drink practices and they were also less likely to support the policy. Interestingly, both these associations for lower educated adults were modified by age group. When compared with older, tertiary-educated adults, younger lower-educated adults were less likely to purchase ‘Everyday’ foods, and middle-aged adults (both tertiary- and non-tertiary educated) were less likely to support the policy.

There was minimal displacement of ‘Occasional’ food purchasing to outlets outside of the hospital following implementation of the twelve food and drink practices.

The likelihood of food purchasing from within to outside the hospital occurred in both directions, that is, the proportions of participants reporting an increased likelihood and a reduced likelihood were comparable. In addition, the proportion of those more likely to purchase food outside the hospital was similar to that reported the previous year (prior to the target date for implementation of the twelve food and drink practices). This suggests that the policy has not resulted in an increase in customers moving their food and drink purchases outside the hospital. Encouragingly, one in five consumers reported changing the types of foods purchased within the hospital. This moderate level of substitution is consistent with the slight, non-significant increase in ‘Everyday’ food purchases observed. Ongoing monitoring of substitution and displacement, and understanding the reasons for consumers changing their behaviour, will be valuable in distinguishing the impact of the intervention on purchasing behaviour from secular trends.

Consumers were increasingly aware of the changes introduced under the *Framework*, although a large number remained unaware. Awareness throughout the study period was higher among staff compared to visitors, not surprisingly due to having a higher likelihood of exposure to the intervention and related communications, and they were significantly more likely to have purchased an ‘Everyday’ food item. Increasing awareness of the *Framework* is an important antecedent to behaviour change, as it may trigger a cue to action, and increase staff and visitor’s perceived behavioural control of healthier food purchasing<sup>(30)</sup>. Given the high level of support for the changes, ongoing promotion of the healthier food options may result in increased awareness and purchase of ‘Everyday’ foods.

Demonstrating the behavioural impact of policy interventions targeting the food environment is challenging, as they may occur gradually or cumulatively, and with complementary prevention efforts<sup>(29)</sup>. This study did not demonstrate statistically significant increases in ‘Everyday’ food purchasing behaviours after initial implementation of



the twelve healthy food and drink practices. Given the complexity of factors involved in food purchasing decisions and the relatively early phase of implementation, however, the results are promising, with a small increase in 'Everyday' food purchases observed, limited displacement of 'Occasional' food purchasing and a high and increasing level of support for the policy. At the time of data collection, unpublished audit data indicate that overall achievement of the twelve food and drink practices was high, although there was variability across practices and outlets. We also observed significant variability across food outlets in the proportion of policy awareness and 'Everyday' food purchases. Further monitoring is recommended, to determine whether the *Framework* has a significant impact on food purchasing behaviour as implementation progresses, and as part of the on-going implementation of the *Framework*.

Our study methods were influenced by the realities of policy timing and sales data accessibility, also reported by others evaluating the effectiveness of real-world policies targeting the food environment<sup>(29)</sup>. Specifically, the study design is limited to repeated cross-sectional intercept-interview data and we were unable to compare how the current data might compare to purchasing behaviour or attitudes of staff and visitors prior to the first target implementation date (removal of SSB). The study design was also premised on implementation of all 'Food and Drink Benchmark' practices by the initial target date of 31 December 2018, but this target was subsequently revised to focus on twelve practices indicative of the 'Food and Drink Benchmark'. As implementation dosage was less than anticipated, this may have also reduced the likelihood of detecting significant improvements in food purchasing behaviours. Our estimates of displacement and substitution rely on consumer self-report and there is the possibility of response bias given the nature of the topic, although every effort was made to structure the survey questions and flow to minimise bias. There was a high proportion of tertiary-educated participants, mostly due to the setting and educational levels of staff; and staff and visitors in smaller hospitals are under-represented. Data were collected during autumn and does not represent what might occur during other seasons, or over the entire year. Time series analysis of retail sales data, with or without a control group, would provide a more robust estimate of purchasing behaviours, including substitution, to account for secular trends.

This study has several strengths, and in the absence of sales data, provides an alternative and objective measure of food purchasing behaviour, collected at the same time of year to minimise seasonal influence. Together with self-report data, this enabled comparison across socio-demographic groups for all purchasing behaviour estimates (including substitution and displacement). The study design and sampling strategy enabled generalisability from the study settings, with a large sample drawn

from a random selection of hospitals (rural, regional and metropolitan), including main entries and cafés/cafeterias and data collection occurring over two whole days. Data collection, recording and coding procedures were designed to mitigate risks of misreporting, misclassification and a measurement effect for food purchase observational data. There was a high response rate and equal numbers of staff and visitors and across age groups were recruited.

This study contributes promising evidence on the acceptability and early positive impact of a healthy food and drink policy for staff and visitors implemented at scale in the hospital setting. The current support for the initiative may be used to underpin further *Framework* implementation, increase awareness, and encourage increased purchasing of 'Everyday' foods. Communication efforts engaging visitors, males, younger adults and those with lower education levels who are currently less responsive to the policy intervention are recommended. Further monitoring to demonstrate impacts over time, including awareness, levels of support and purchasing behaviours, particularly amongst these groups, will be an important accompaniment to continued implementation and targeted promotion efforts.

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of Helsinki and all procedures involving research study participants were approved by the South West Sydney Local Health District Human Research Ethics Committee. Verbal informed consent was obtained from all subjects. Verbal consent was witnessed and formally recorded.

### Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980021003426>

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