

Derailing healthy choices: an audit of vending machines at train stations in NSW

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Introduction

Vending machines epitomise the high availability and convenience of food and beverages in Western society and are available in many settings, including schools,^{1,2} workplaces³ and health care facilities.⁴ In some locations, the availability of alternative food and beverages outside of vending machines may be limited.⁵ In 2006 there were 3.5 million vending machines in the US for cold beverages alone.⁶ While no Australian industry data are available, observational evidence indicates that these machines are ubiquitous and stock predominantly unhealthy drinks and snacks. Such persistent exposure to unhealthy foods and beverages can influence consumption by providing increased opportunities for the purchase of unhealthy items, and by providing visual cues to prompt consumers to eat and drink.⁵

Train stations provide opportunities to purchase food and beverages, and many consumers are exposed to these venues daily, on their commute to and from work. One in five Australian adults used public transport as their main mode of travel to work/study in 2006, although this was higher in Sydney (26%).⁷ The relatively closed environment of train stations means that commuters are limited to the products available on site or in the immediate vicinity. As such, these venues may cumulatively contribute to excess energy consumption if the foods and beverages offered are energy dense.

This survey aimed to determine the nature of food and beverages available to commuters through vending machines on train platforms across the Greater Sydney Metropolitan area. This information will be useful to guide future interventions to modify food environments in these settings.

Methods

Sampling

100 train stations (from a possible 291) were selected across the Sydney Greater Metropolitan region through stratified random sampling. Stations were stratified by socioeconomic status (SES) according to the Australian Bureau of Statistics Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Advantage and Disadvantage, based on postcode.⁸ SEIFA scores were classified as high (>1,100), medium (1,000-1,100) and low (<1,000). Stations were further stratified as major or minor, with major stations defined as interchanges between services.⁹

Measures

A survey tool was developed to quantify the types of products available in vending machines, based on instruments used to assess food environments and environmental stimuli affecting food choices.^{1,10} Information was collected on: i) the availability of food and beverages (number of slots and machines); ii) food and beverage promotions on the exterior of machines and on billboards; iii) the cost of products, and; iv) the availability of water fountains.

Machines were classified as being either for cold drinks, hot drinks or snacks. Cold drinks and snacks were classified as lower energy (healthy) and higher energy (unhealthy) using NSW school canteen criteria.¹¹ Food and beverage criteria are shown in Table 1. Hot drink machines were assessed for availability of reduced fat/skim milk. The cheapest price per station was recorded per serve for sugary drinks (375mL and 600mL); diet drinks (375mL and 600mL); water (600mL);

Abstract

Issue addressed: Train stations provide opportunities for food purchases and many consumers are exposed to these venues daily, on their commute to and from work. This study aimed to describe the food environment that commuters are exposed to at train stations in NSW.

Methods: One hundred train stations were randomly sampled from the Greater Sydney Metropolitan region, representing a range of demographic areas. A purpose-designed instrument was developed to collect information on the availability, promotion and cost of food and beverages in vending machines. Items were classified as high/low in energy according to NSW school canteen criteria.

Results: Of the 206 vending machines identified, 84% of slots were stocked with high-energy food and beverages. The most frequently available items were chips and extruded snacks (33%), sugar-sweetened soft drinks (18%), chocolate (12%) and confectionery (10%). High-energy foods were consistently cheaper than lower-energy alternatives.

Conclusions: Transport sites may cumulatively contribute to excess energy consumption as the items offered are energy dense. Interventions are required to improve train commuters' access to healthy food and beverages.

Key words: food environment, food availability, food promotion, train stations

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So what?

Policy interventions in these settings may be more expedient than in other areas, as these settings are under public control and hence subject to government policy directives.

100% juice (350mL); and for one serve of chocolate/confectionery, unhealthy snacks, healthier snacks, and fruit or nuts.

Procedure

Data were collected by two research officers in January and February 2011. Each station was visited by one research officer, who scanned train platforms for vending machines and advertisements. Machines that were not accessible from platforms were excluded. Inter-rater reliability was assessed by coding the same five vending machines, with 96% agreement.

Data analysis

Data were entered into SPSS for Windows version 17.0. Differences in content of vending machines according to the SES of areas and major/minor stations were assessed using one-way ANOVA with post-hoc Scheffe testing, and independent samples t-tests. *P*-values ≤ 0.05 were considered significant.

Results

The sample included 40 stations from low SES areas, 39 from medium SES areas and 21 from high SES areas, with an equal distribution of major and minor stations.

Number of vending machines

Fifty-nine stations had at least one vending machine, with 206 machines identified. Most machines were for cold drinks (53%), followed by snacks (41%). The mean number of machines per site was higher at major stations (3.1 vs. 1.0 at minor stations), and at stations in low and medium SES areas (2.1 and 2.3 vs. 1.5 in high SES areas).

Vending machine contents

Overall, 5,168 occupied slots were identified. Of these, 40% were for cold drinks, 59% were for snacks and 1% was for hot drinks. In these machines, most slots were for unhealthy cold drinks (65% of drink slots) and unhealthy snacks (97% of snack slots). This trend was similar across all areas and station types. No hot drink machines offered reduced fat/skim milk. The most frequently available drinks were sugar-sweetened soft drinks and water (Table 1). Unhealthy chips/extruded snacks (>600 kJ/serve) were the most available snacks, followed by chocolate and confectionery. Almost all cold drink and snack machines had at least one healthy choice (96%). The mean number of healthy items in cold drink machines was 6.7 (SD = 6.4) and for snack machines was 1.2 (SD=0.8).

High SES areas had a greater mean number of unhealthy products available per machine (25.8 vs. 18.5 and 21.1 in low and medium SES areas; $F(2, 203) = 3.27, p = 0.04$) (Table 2). However, vending machines in medium and high SES areas also had a higher mean number of healthy items ($F(2, 203) = 7.52, p = 0.001$). This was due to the higher mean number of vending machine slots overall in medium and high SES areas (27.1 and 32.6 vs. 22.0 in low SES areas). Water fountains were available at 23 train stations.

Cost

The mean price for a healthy beverage was \$3.20 and for an unhealthy option was \$3.60. The mean price for a healthy snack was \$2.50 compared to \$2.20 for an unhealthy option.

Promotions

Overall, 216 advertisements of branded food/beverage items were identified on vending machine exteriors. The greatest proportion was for unhealthy snacks (41%) and water (36%). Twenty-one sites had billboards advertising food or beverages, with 81 advertisements identified. The greatest proportion was for alcohol (27%), water (27%), dairy drinks (12%) and unhealthy snacks (9%).

Discussion

This study confirms the lack of healthy food choices available at train stations in NSW. Encouragingly, the availability and promotion of water was high and water was often cheaper than sugary drinks of the same serving size. However, there were almost no healthy snacks available in vending machines or promoted on the exterior

Table 1: Food and drink items in vending machines.

Snacks	Slots n (%)	Beverages	Slots n (%)
Less healthy items			
Chips/extruded snacks (>600 kJ/serve)	1667 (55)	Sugary soft drinks	897 (42)
Chocolate	611 (20)	Sugary energy drinks	206 (10)
Confectionery/lollies	496 (16)	Sugary flavoured water/iced tea	124 (6)
Muesli bars (>600 kJ/serve)	88 (3)	Sports drinks	101 (5)
Sweet biscuits (>600 kJ/serve)	81 (3)		
Popcorn (>600 kJ/serve)	2 (0)		
Rice crackers (>600 kJ/serve)	1 (0)		
Savoury biscuits (>600 kJ/serve)	1 (0)		
Healthy items			
Chips/extruded snacks (<600 kJ/serve)	93 (3)	Water (plain, mineral, soda)	451 (21)
Dried fruit/nuts/seeds	7 (0)	Diet soft drinks	238 (11)
Tinned tuna and crackers	1 (0)	100% fruit or vegetable juice	37 (2)
		Diet energy drinks	1 (0)
Total	3,048 (100)	Total	2,055 (100)

Table 2: Mean number of healthy and unhealthy products, by SES.

	Mean unhealthy items / machine (SD) (%)	Mean healthy items / machine (SD) (%)	Total (n)
Low SES	18.5 (14.9) (89%) ^a	2.3 (2.3) (11%) ^{a,b}	1,746
Med SES	21.1 (13.5) (81%)	5.1 (6.7) (19%) ^b	2,355
High SES	25.8 (11.4) (82%) ^a	5.6 (6.3) (18%) ^a	1,002

a $p < 0.05$; *b* $p < 0.001$

SD = standard deviation

of machines or at train stations and the healthy snacks that were available were more expensive. Excluding chips and extruded snacks in smaller packages, which were classified as healthier in the current study if they contained 600 kJ or less per serve, only eight out of the 3,048 food items identified were considered to be healthier choices. Although vending machines in high SES areas had a significantly greater mean number of unhealthy items available, commuters in socially-disadvantaged areas were exposed to greater numbers of vending machines and proportionally more unhealthy choices compared to healthier options in those machines.

Food outlets are recognised as a setting for encouraging the purchase and consumption of healthy food and beverages.¹² As well as improving diet quality, strategies to improve the healthiness of food environments are also likely to have broader effects, including influencing perceived norms, and knowledge and attitudes towards healthy eating.³

A range of potential intervention points are available to modify vending machines at the point-of-purchase. These include modifying the: availability of healthy food, including changing offerings and portion sizes; access to healthy food, including price incentives and premium offers; and information to guide food selection, including signage and labels.¹² Evidence indicates that such intervention strategies can have a positive effect on sales of healthy choices and/or changes to more favourable dietary patterns.¹² In closed sites where alternative food purchasing options are limited, vending machine interventions are more likely to be effective.¹² It should be noted that in the current study, 15 stores selling food and drinks were also identified on train platforms. Store owners were approached for permission to assess the availability and cost of food and beverages within stores. However, three refused participation and one store was closed at the time of the site visit. Therefore, due to the small number of stores identified, these were excluded from analyses.

This study is limited by its observational cross-sectional design. Therefore, findings can only suggest associations between exposure and food choices. Also, other food classification systems could be used to categorise food and beverages. The use of the NSW school canteen criteria may have provided a conservative estimate of healthy choices as energy-dense foods that are packaged in smaller serving sizes are considered to be healthier.

Future research is required to assess which point-of-purchase strategies or combination of strategies would be most useful to increase sales of healthier food and drink items and decrease sales of unhealthy items. The potential for any unintended consequences on consumers' purchasing behaviours resulting from these strategies should also be assessed, such as the purchasing of a larger number of items if they are presented in smaller serving sizes. Barriers to the implementation of healthy food within vending machines need to be taken into account, including the shorter shelf life of some healthier items. A range of less perishable healthier snacks is available in the market place that could be stocked within vending machines, such as lower-energy baked chips, some muesli bars, tinned or dried fruit and nuts. The success of earlier policies to improve the healthiness of vending machines in schools and hospitals in Australia demonstrate the feasibility of supplanting unhealthy food products with healthier choices.^{13,14}

Modifying food environments to improve communities' access to, and the availability of, healthy foods is an important public health

intervention to facilitate healthy food choices.¹² Population-based interventions which aim to modify food environments at the point-of-purchase have the potential for larger population-wide improvements in diet quality and are likely to be more cost-effective than individually targeted strategies.¹⁵ Food outlets, including vending machines, have been recognised as an opportunity for encouraging the purchase and consumption of healthy products. Train stations are an ideal setting to implement such changes given that they are controlled by State Government and therefore policy interventions may be easier to implement than in commercially-owned settings.

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