



Advertising and availability of ‘obesogenic’ foods around New Zealand secondary schools: a pilot study

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Abstract

Aims To examine the extent and content of outdoor food advertisements and food availability from outlets in the vicinity of secondary schools.

Methods The sample of schools (n=10) was randomly selected from a sample frame of schools in both an urban and rural region (Wellington and Wairarapa regions respectively) and at each extreme of the socioeconomic status (SES) distribution (based on school characteristics). An area of 1-km radius around the schools was examined for food and non-food product advertisements and shops/outlets.

Results Out of 1408 outdoor advertisements for products, 61.5% were for food (i.e. 28 per square kilometre). The major categories were soft drinks (21.6%), frozen confectionary (16.2%), savoury snacks (11.4%), and alcohol (8.1%). Overall, 70.2% of food advertisements were for foods classified as ‘unhealthy’ (i.e. inconsistent with the national nutritional guidelines for adolescents).

A majority of the 224 outlets sold food (i.e. 56.3%). Those that primarily sold food were (on average) closer than other outlets to the secondary schools (p=0.03). Out of those schools that sold meals, the proportion of these that advertised a salad option was significantly lower in the low SES neighbourhoods (p=0.006). Other significantly different patterns for food outlet distribution, and category of advertised food were found by SES and rurality.

Conclusion Although only a pilot study, the information obtained suggests that food advertising and food outlets are prevalent in the vicinity of secondary schools and that the advertising is generally not compatible with nutritional guidelines for adolescents. Larger studies into such advertising are needed as well as consideration of policy options to control aspects of the ‘obesogenic environment.’

There is growing concern over the prevalence of obesity and related chronic diseases such as diabetes in New Zealand (for example, as shown in the *New Zealand Medical Journal* articles that appeared in the 17 December 2004 ‘theme’ issue. URL: <http://www.nzma.org.nz/journal/117-1207/>).

Over the last 25 years, the prevalence of obesity has doubled in New Zealand adults.¹ Also, the National Children’s Nutrition Survey found that 31% of New Zealand children were overweight or obese, with this figure being over half in some population groups.² Childhood obesity is a risk factor for adult obesity but it also has its own adverse psychological and health impacts (e.g. increased risk of insulin resistance syndrome³).

Many factors are likely to be involved in the New Zealand and global obesity epidemic, but a key component is probably the ‘obesogenic’ environment, which facilitates both overeating of energy dense food and physical inactivity.^{4,5} One

component of this obesogenic environment is the high prevalence of food advertising and the nature of the food advertised (i.e. energy-dense foods that are high in free sugars and fat).

Food advertising has been shown to work on children according to an experimental study of children exposed to a videotape with embedded advertisements.⁶ The exposed children were significantly more likely to choose the advertised items than children who saw the same videotape without advertisements ($p < 0.01$). There has also been one randomised trial that indicates that reducing children's television viewing time is associated with statistically significant decreases in body mass index⁷—but the role of reducing physical inactivity versus advertising exposure were not separated out.

The authors of a recent systematic review also reported that there was good evidence that food advertising influences food preference and purchase behaviour by children.⁸ In addition, compared to lean children, there is also evidence that overweight and obese children demonstrate heightened recognition of food advertisements and consume more food after exposure to such advertisements.⁹

In New Zealand, research has found that food advertising on television during children's viewing hours is predominantly for foods high in sugar, fat, and/or salt.^{10–12} However, there have been no published studies of outdoor food advertising in the New Zealand setting. Furthermore, there has been no work on the 'obesogenic' environment around schools—despite some work on assessing the obesogenic environment inside primary schools.¹³ Therefore, this study was a first attempt to examine the food advertising and food availability environment around secondary schools in New Zealand.

Methods

Region and school selection—The urban and rural regions selected for this pilot study (Wellington, Lower Hutt, Upper Hutt, and Porirua cities as well as the Wairarapa region) were a convenience sample. Rurality was defined as towns with a population of less than 20,000 people, with all towns in the Wairarapa region being within this range.

Only secondary school neighbourhoods were sampled, because:

- Adolescents generally have more spending power than younger children (via pocket money and earnings); and
- They have more freedom to move around the neighbourhood.

The sample of 10 schools (6 urban and 4 rural schools) were randomly selected from a sample frame of secondary schools at each extreme of the socioeconomic distribution (i.e. the top and bottom two deciles for urban schools, and the top and bottom halves for the rural schools—giving five schools, each, in the two socioeconomic categories). This sample frame excluded schools located in central business districts (CBDs) as well as rural schools that were outside towns (i.e. completely rural settings).

The socioeconomic rankings were from the Ministry of Education classification system¹⁴ that is based on the socioeconomic status (SES) of the children who attend the school. It therefore gives a general measure of the SES of the school neighbourhood. Decile 1 is the lowest ranking and represents the most deprived SES grouping, while decile 10 represents the wealthiest grouping.

The urban schools and their decile scores were: Hutt International Boys School (10); Onslow College (10); St Patrick's College (Silverstream) (9); Naenae College, (2); Mana College (2); and Porirua College (1).

The rural schools were: St Matthew's Collegiate (Masterton), (10); Solway College (Masterton), (9); Kuranui College (Greytown), (6); and Makoura College (Masterton), (4).

Neighbourhood search strategy—Using a global positioning system (GPS) device, the main school gates were spatially located and then the 1-km radius area around the schools was systematically searched for food and non-food product advertisements and shops/outlets (during December 2004 and January 2005). A map was used in conjunction with the GPS device to allow a systematic search along every street within the defined area. The 1-km radius was an arbitrary distance but it is within the range for which young people could readily walk to school or to food outlets (e.g. to buy food during the school lunch-hour). It compares to the 1000-foot buffer zone for restrictions on outdoor tobacco advertising used in the USA.¹⁵

Advertisement definition—Outdoor advertisements were defined as stationary objects containing either a recognisable logo and/or an intended message. These included billboards, neon signs, posters, stickers, free-standing signs, banners, painted buildings, bus shelter advertisements, flags, and images in shop windows designed for viewing from outside (i.e. advertisements on buses and delivery vehicles were excluded).

Only advertisements for products or types of products were included—so signs for services and entertainment activities (i.e. airfares/travel, banking, dry cleaning, flybuys, gambling, hairdressing, movies, sports activities, medical and veterinary care, and video rentals advertisements) were excluded.

Outlet definition—Outlets were defined as places primarily offering food or non-food products for sale. This definition excluded those establishments selling primarily non-food services (e.g. lawyer's chambers, doctor's and vet surgeries, land agents, travel agents, hair salons, betting shops, and car repair shops).

Data collection—Data was collected on all product advertisements with regard to the product, brand, size, distance from the secondary school gate (GPS reading), and location. A digital photograph was also taken of all food advertisements, defined as those with food being the major product advertised (and including alcohol, coffee, and water).

At each food outlet, data were collected on its name, description of contents/products sold, distance from the secondary school gate (GPS reading), and a photograph was taken. All the data were entered into a Microsoft Excel spreadsheet and analysed with the EpiInfo (CDC, Atlanta) software package. All rate ratios calculated were adjusted for neighbourhood SES and/or rurality (as appropriate).

Nutritional classification—A system was developed to classify all of the advertised food products. All advertisements were classified as 'healthy' unless they were for:

- A food specifically listed as a high fat, salt and/or sugar food in the *New Zealand Food and Nutrition Guidelines for Adolescents*¹⁶—including chocolate bars, muesli bars, potato chips/crisps, french fries, doughnuts, pies, sweets, fruit leathers, and soft drinks.
- An alcoholic beverage (also specifically not recommended in the above *Guidelines*).
- A frozen confectionary product that was not labelled 'low fat' (since the *Guidelines* recommend 'low fat' versions of dairy products) or was a high sugar product (e.g. an ice block).
- Food from fast food franchise chains, takeaway outlets, or outlets selling pizzas; where the advertisement did not indicate that the outlet sold salad or vegetable options.

As a conservative approach was taken, other foods that had a mix of desirable and undesirable nutritional characteristics were all classified as 'healthy' in this analysis. These foods were: juices; sports drinks; diet soft drinks; milkshakes; flavoured milk; coffee; food from bakeries (unless just pies were advertised), cafés, and restaurants; and all staple foods (including bread made from refined flour and meat regardless of its fat content).

Results

Extent of advertising in the school neighbourhoods—A total of 1408 advertisements for products were documented outdoors in the areas surrounding the 10 schools. Of these advertisements, 61.5% (95% confidence interval (CI)=58.9–64.0) were for food products (Table 1). This equates to an average of 87 outdoor food

advertisements in the 1-km radius surrounding a school (i.e. 28 per square kilometre). In all but one of the school neighbourhoods, food advertisements were more common than non-food product advertisements (Table 1). The proportion of advertising for food was significantly greater in high SES (wealthier) neighbourhoods (rate ratio [RR]=1.18; 95% confidence interval [CI]=1.03–1.34; $p=0.01$). However, food advertisements in low SES neighbourhoods were significantly closer to the secondary schools relative to those in high SES ones ($p<0.0001$).

Characteristics and setting of food advertisements—A majority (68.9%) of food advertisements were in the ‘large’ category (at least the size of an A1 sheet of paper—59 x 84 cm). There were proportionately more food advertisements than non-food advertisements in this large size category (68.9% vs 43.2%; $p<0.00001$).

Most of the food advertisements were associated with dairies/convenience stores (52.2%), and the rest were associated with other outlets (44.3%) or in other settings (3.5%)—i.e. on bus shelters, or stand-alone billboards.

The major categories of advertised food were: soft drinks (21.6%), frozen confectionary (16.2%), savoury snacks (11.4%), and alcohol (8.1%) (Table 2). Some of the food categories comprised a significantly greater proportion of the food advertisements in high SES neighbourhoods than low SES ones (i.e. foods from takeaway outlets [RR=1.54], foods from fast food franchise outlets [RR=1.67], and alcohol [RR=1.50] [$p<0.001$ for each]). However, advertisements for staple foods were relatively more common in low SES neighbourhoods (RR=2.04, 95% CI=1.54, 2.69; $p<0.0001$). The proportion of frozen confectionary foods advertisements was higher in rural than urban neighbourhoods ($p=0.048$).

Out of the top-10 advertisements with branded products, 6 were for food products. Out of all the food products, the top-10 brands were *Coke/Coca Cola* (17.6%), *Tip Top* ice cream (10.4%), *Meadow Fresh* dairy foods (3.9%), *Cookie Time* cookies and snack bars (2.4%), *Burger King* (2.0%), *Streets* ice cream (1.8%), *Tui* beer (1.7%), *Anchor* dairy foods (1.6%), *Mrs Macs* meat pies (1.5%), and *V* (caffeinated) energy drink (1.5%).

Nutritional classification of food advertisements—Overall, 70.2% (95% CI=67.0%–73.2%) of the food advertisements were categorised as ‘unhealthy’—i.e. inconsistent with nutritional guidelines (Table 3). High SES (wealthier) neighbourhoods had significantly more ‘unhealthy’ food advertisements compared to low SES ones (RR=1.46; 95% CI=1.20–1.76; $p<0.001$).

The analysis for just large advertisements also showed this pattern ($p=0.002$). There were no statistically significant differences by rurality. The majority (80%) of the top-10 branded food advertisements were also in the ‘unhealthy’ category.

Outlets in the school neighbourhoods—There were 224 outlets selling products in the sampled neighbourhoods of which 56.3% primarily sold food and 67.9% sold at least some food (e.g. petrol stations selling fuel, food, and other groceries) (Table 4). Rural neighbourhoods had relatively lower proportions of outlets selling primarily food compared to other product outlets (RR=0.57; 95% CI=0.36–0.92; $p=0.01$). This was also the pattern for outlets that sold any food (RR=0.55; 95% CI=0.35–0.86; $p=0.007$). Furthermore, there was a higher proportion of outlets selling alcohol in the high SES neighbourhoods (RR=1.80; 95% CI=1.44–2.25; $p=0.001$).

Table 1. Distribution of outdoor food advertisements in the 10 secondary school neighbourhoods (1-km radius area) studied in the Wellington and Wairarapa regions

School (around which the neighbourhood was defined)	Food and non-food product advertisements*	Food advertisements	Proportion of product advertisements for food	Distance of food advertisements from the school gate (m)		
	n	n	%	Mean	Median	Range
Hutt International Boys School	149	98	65.8	660	791	315–993
Kuranui College	44	24	54.5	377	337	300–718
Makoura College	80	42	52.5	486	471	305–766
Mana College	201	77	38.3	553	593	118–930
Naenae College	351	228	65.0	580	605	37–827
Onslow College	145	96	66.2	777	828	234–990
Porirua College	141	110	78.0	691	684	355–950
Solway College	84	62	73.8	734	746	637–841
St Matthew's Collegiate	80	44	55.0	833	910	684–995
St Patrick's College (Silverstream)	133	85	63.9	337	229	31–937
All schools	1408	866	61.5	613	675	31–995
All high SES schools (deciles 6–10)	591	385	65.1	650	746	31–995
All low SES schools (deciles 1–5)	817	481	58.9	583	640	37–950
All urban schools	1120	694	62.0	604	671	31–993
All rural schools	288	172	59.7	650	684	300–995

*The definition of food in this analysis includes 'alcoholic beverages', water, and coffee; SES=socioeconomic status.

Table 2. Categories of the outdoor food advertisements (N=886) and distribution by socioeconomic status and rurality of the neighbourhood (all 10 school neighbourhoods)

Food category	All areas		High SES areas	Low SES areas	Urban areas	Rural areas
	n	%	%	%	%	%
Soft drinks	187	21.6	18.4	24.1	22.5	18.0
Frozen confectionary (e.g. ice cream)	140	16.2	16.6	15.8	14.8	21.5
Savoury snacks (e.g. pies, potato crisps, bakery goods [excluding bread]).	99	11.4	10.6	12.1	11.4	11.6
Alcohol	70	8.1	11.9	5.0	7.5	10.5
Other staples (e.g. meat, fruit/vegetables)	70	8.1	0.5	14.1	9.2	3.5
Foods from takeaway outlets (e.g. fish & chip shops)	65	7.5	11.2	4.6	7.3	8.1
Milk	61	7.0	7.0	7.1	6.1	11.0
Food from fast-food franchise outlets (e.g. <i>McDonalds</i> , <i>KFC</i> , <i>Burger King</i>)	50	5.8	9.4	2.9	5.6	6.4
Bread	32	3.7	2.6	4.6	3.9	2.9
Other drinks (e.g. coffee, flavoured milk, water, sports drinks)	29	3.3	4.4	2.5	3.5	2.9
Snack confectionary	26	3.0	2.6	3.3	3.3	1.7
Food and meals from restaurants, cafés, or bars	23	2.7	2.1	3.1	3.0	1.2
Juice	14	1.6	2.6	0.8	1.9	0.6
Total	866	100	100	100	100	100
All staples (milk, bread, and 'other staples').	163	18.8	10.1	25.8	18.8	17.4

Note: Percentages do not add up exactly to 100.0% due to rounding; KFC=Kentucky Fried Chicken.

Table 3. Number and proportion of outdoor food advertisements (N=866) classified as 'unhealthy' in relation to socioeconomic status and rurality of neighbourhoods

Size of food advertisement	All areas		High SES areas	Low SES areas	Urban areas	Rural areas
	n	%	%	%	%	%
All sizes	608	70.2	77.9	64.0	68.6	76.7
Only 'large' size*	441	73.9	79.6	68.9	73.7	74.6

*The size of an A1 sheet of paper (59 x 84 cm) or larger; SES=socioeconomic status.

Table 4. Distribution of food and alcohol outlets compared to other product outlets (by socioeconomic status and rurality of neighbourhoods) and by distance from the secondary school (n=224 for all outlets)

Outlet type	All areas			High SES areas		Low SES areas		Urban areas		Rural areas	
	n	%	Mean distance (m)	%	Mean distance (m)	%	Mean distance (m)	%	Mean distance (m)	%	Mean distance (m)
Primarily food	126	56.3	614	57.1	647	55.5	584	60.0	592	42.9	727
All other outlets	98	43.8	684	42.9	764	44.5	617	40.0	641	57.1	792
Any food	152	67.9	618	70.5	653	65.5	585	71.4	596	55.1	723
All other outlets	72	32.1	701	29.5	802	34.5	625	28.6	651	44.9	815
Alcohol	23	10.3	718	18.1	724	3.4	689	9.1	639	14.3	898
All other outlets	201	89.7	636	81.9	691	96.6	595	90.9	609	85.7	742

SES=socioeconomic status.

Table 5. Extent of meal availability from outlets selling primarily food (N=126), and the proportion of advertised meals with salad options*

Outlet characteristic	All areas		High SES areas		Low SES areas		Urban areas		Rural areas	
	n	%	n	%	n	%	n	%	n	%
Meals available	74	33.0	40	38.1	34	28.6	62	35.4	12	24.5
Salad option advertised	52	70.3	33	82.5	19	55.9	43	69.4	9	75.0

*Meals include either lunch or dinner; SES=socioeconomic status.

Outlets that primarily sold food were (on average) 70 metres closer to the secondary schools than other outlets ($p=0.03$). This was also the case for any outlets selling food ($p=0.02$).

Of all the outlets, 33.0% sold (lunch or dinner) meals (Table 5). There were higher proportions of these outlets in the high SES neighbourhoods and in the urban ones (but this difference was not statistically significant). However, the proportion of these outlets that advertised a salad option as part of the meal was significantly lower in the low SES neighbourhoods (RR=0.52; 95% CI=0.28–0.96; $p=0.006$).

Discussion

Main findings and interpretation—This pilot study found that a majority (61.5%) of outdoor advertisements for products in the neighbourhoods of these schools were for food. The density of these advertisements (28 per square kilometre) is, however, a probable underestimate of the total outdoor food advertisement level—as this study did not include advertisements on vehicles such as buses or delivery vans. The level of outdoor advertising is also only a small part of the total level of food advertising (e.g. when considering television, radio, print media, and advertising within outlets and on product packaging).

Overall, 70.2% of food advertisements were for foods classified as ‘unhealthy’ (i.e. inconsistent with national nutritional guidelines for adolescents). This may also be an underestimate given that the classification system used was conservative (e.g. all bread, all meat, juices, and sports drinks were classified as ‘healthy’). This is despite some of these being high in sugar, some meat products being high in saturated fat, and most bread being made from refined flour. Furthermore, 8 of the top-10 food brands were for foods that did not fit with the nutritional guidelines.

The higher proportion of ‘unhealthy’ food advertisements in the high SES neighbourhoods may reflect the higher levels of disposable income among adults (and probably children) in these areas. This disposable income reason may also explain the advertising patterns for some food categories (e.g. proportionately more advertising for [relatively expensive] alcohol in high SES neighbourhoods, and for [relatively cheap] staple foods in low SES neighbourhoods). Despite such SES patterns, the high prevalence of food advertising is still concerning when considering low SES children—as these children may be at the highest risk of obesity and may be less likely to bring food for lunches from home.²

Our study also found that a majority (56.3%) of the outlets in these neighbourhoods sold food. The reason why food outlets were significantly closer (on average) than non-food outlets to the secondary schools, may be because location near a school provides significant extra sales for these food outlets.

A significantly lower proportion of the meal outlets in low SES neighbourhoods advertised a salad option than those in higher SES ones. This finding, along with that of a greater proportion of the outlets in high SES neighbourhoods selling alcohol, may also be explained in terms of differing levels of disposable income. Work in other countries has also reported that poor social opportunity¹⁷ and rurality¹⁸ can adversely affect access to healthy foods. For example, an Australian study found that people living in low SES categories had higher exposure to fast-food outlets.¹⁹

Our study also found that slightly more food advertisements were in the ‘large’ size category relative to non-food advertisements. This is a similar finding to that from a study of outdoor alcohol advertising in New Zealand.²⁰

Study limitations—As this was a small pilot study in just two regions of New Zealand (Wellington and Wairarapa), the results may not be generalisable to the rest of the country. Furthermore, it was limited to a cross-sectional design that cannot detect temporal patterns. For example, there could be seasonal variation in the level of some forms of advertising (e.g. more soft drinks and ice creams in summer). Nevertheless, frequent changes in the larger advertisements (i.e. the majority of them) would seem unlikely as many of these are probably fairly expensive.

As detailed above, the definition of ‘unhealthy’ food was conservative and so may not fully reflect state-of-the-art nutritional recommendations (e.g. as recently developed for the United States²¹). In addition, the definition for SES for the neighbourhoods was somewhat limited as it was based on the SES of the children attending the school (i.e. if the children tended to come from a wide area then their SES may not correlate well with the area directly around the school).

A more sophisticated analysis could also use small-area measures of deprivation (e.g. NZDep). It could also consider exposure to outdoor advertising arising from:

- School policies around permitting pupils to leave the school grounds to buy their lunch; and
- How pupils travel to school (since students who walk are likely to have higher exposure compared to those who bus or are driven).

Research and policy implications—Given the limitations above and the pilot nature of this study, it is clear that further methodological refinements could be pursued in future studies. The most important of these refinements would probably be to randomly sample school neighbourhoods around the country and to better place outdoor food advertising into a context of total food advertising exposure (such as relative to television). Refining the classification tools (for food nutritional quality and neighbourhood SES) and collecting exposure data are also desirable to establish a better baseline upon which future monitoring can occur.

Despite the pilot nature of this study, it has provided some initial information about the prevalence and the relatively ‘unhealthy’ content of food advertising in secondary school neighbourhoods. These findings provide tentative support for responses by policy-makers to reduce aspects of the ‘obesogenic’ environment.

One of these responses could be restrictions of certain forms of food advertising in the vicinity of schools (as done with tobacco advertising in the USA¹⁵). Moreover, regulations (or even taxes) could be used to shift the balance of advertising towards foods that meet nutritional guidelines. Indeed, advertising has sometimes been a force for improving the New Zealand diet (e.g. industry marketing of low-fat milk, low-salt foods, and olive oil products).

A supplementary approach may be to follow the example of cigarette packet warnings and require such warnings on unhealthy food advertisements along with permitting ‘signposting’ that indicates when a food is compatible with nutritional guidelines.⁵

However, a coordinated approach may be needed so that further controls in one domain, such as outdoor advertising, does not lead to further advertising growth in other media, such as television and Internet advertising.

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