Food and beverage advertising in Hong Kong mass transit railway stations

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Abstract

Objectives: To examine the extent and characteristics of food and beverage (F&B) promotion in Hong Kong mass transit railway (MTR) stations in districts with different socioeconomic statuses (SES) and school density.

Design: All advertisements located in the eight selected MTR stations were recorded by photographs or videos, and classified into F&B and non-F&B. The percentage of F&B advertisements and unhealthy F&B being promoted, and common persuasive marketing strategies used in F&B advertisements were compared between low *v.* high SES districts and school zones *v.* non-school zones.

Setting: MTR stations in Hong Kong.

Participants: Not applicable.

Results: Of the 8064 advertisements documented, 861 (10·7 %) were F&B advertisements, promoting 1860 F&B items. More than half of the these were unhealthy foods. Stations in high SES districts or school zones tend to advertise more unhealthy items (high *v.* low SES: 55·8 *v.* 50·8 %, $P = 0.049$; school *v.* non-school: 60·8 *v.* 49·3 %, $P < 0.001$). More than one-third of the F&B advertisements recorded did not utilise any of those persuasive marketing techniques that were examined, and using models (13·9 %) or providing discounts (8·8 %) were the two most frequently used non-festival-related persuasive marketing strategies.

Conclusions: Unhealthy F&B advertising in MTR stations is prevalent regardless of SES and school density, and persuasive marketing strategies were infrequently used. These suggest that a ban on unhealthy F&B advertising around schools or the use of persuasive marketing strategies alone would be ineffective in Hong Kong. To align with the recommendation from WHO, a universal ban of junk food advertising should be enacted.

Previous studies suggest that junk food advertising is contributing to a rise in childhood obesity[1]. It has been demonstrated that a high frequency of advertising in different media is likely to increase the awareness and appeal of the food brand and products, thus leading to a higher likelihood of purchase and consumption[2,3]. Other studies also found that food advertising may predispose children and adolescents to regular consumption of unhealthy food[4], which may increase the risk of developing chronic diseases such as type 2 diabetes mellitus and CVD[5,6], as well as psychological issues related to obesity, such as lower self-esteem, behavioural problems and less social capability[7]. However, such effects were not observed for adults based on a recent meta-analysis of eighteen studies[8].

Apart from advertising in popular media such as television, outdoor advertising is also considered an important avenue for food promotion. Given the very high utilisation rate of public transportation in Hong Kong and the shift to mass transit railways (MTR) as the backbone of transport systems during urban planning[9], advertising on buses and MTR is a prominent promotional plan[10]. MTR advertising is promoted by local advertising agencies as the best out-of-home promotion in terms of its ability to reach highly educated passengers with higher personal incomes, a high variety of advertising formats with a visual impact, its close proximity to customers and high engagement[11]. In fact, unlike TV advertising where there is usually only one primary target group, a diverse group of passengers in MTR stations

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favours advertisements with no specific target group, thereby maximising the promotional effect.

Results from previous studies examining the effect of socioeconomic statuses (SES) and school density on advertising placement in western countries were inconsistent[12–15], suggesting that the placement of food and beverage (F&B) advertisement may be influenced by other factors such as infrastructure, layout of the venue, population density and town planning. Importantly, there is currently no relevant study in Asian countries or regions with densely populated urban districts and high utilisation of the MTR system, where both SES and school density were expected to influence advertisement placement. Therefore, the current study aimed to examine the extent and characteristics of F&B advertisements in a selected sample of Hong Kong MTR stations in districts of various SES and school densities, as well as to scrutinise whether the children or lower SES audience were specifically targeted.

Methods

Selection of mass transit railway stations

In the current study, eight MTR stations were chosen and classified into four categories: (i) high SES with school zone, (ii) low SES with school zone, (iii) high SES without school zone and (iv) low SES without school zone. Unlike other regions or cities where commuter train stations have a unidirectional passenger flow in peak hours[16], MTR plays an important role in daily commuting and connections among different districts. Therefore, in the current study 'school zone' was defined based on the connectivity of peripheral primary and secondary schools and the density in that particular district. Setting a circular area with a radius of 500 m in GeoInfo Map provided by the Lands Department of Hong Kong, with reference to the list of schools provided by the Education Bureau of Hong Kong[17], the number of schools (including kindergarten, primary, secondary and tertiary education institutes) was counted manually, and a school zone was defined as one with more than five schools (HKU, Kowloon Tong, Kowloon Bay and Tin Shui Wai), while a non-school zone was defined as one with fewer than five schools (Kwai Fong, Mong Kok, Ngau Tau Kok and Sheung Wan).

SES was primarily determined based on the median monthly household income of the population living adjacent to an MTR station. Based on the data of Census 2016, the median monthly household income of populations living around Kowloon Tong and HKU stations was $HK89 300 and $HK83 000, respectively[18]. Mong Kok and Sheung Wan, although with lower median monthly household incomes of $20 000 and $26 000, respectively, are special cases as they are traditional business districts with many commercial buildings and mega-shopping malls, both contributing substantially to the patronage

Table 1 Socioeconomic status (SES) and school density classifications for the selected mass transit railway stations

	School zone	Non-school zone
High SES	HKU Kowloon Tong	Sheung Wan Mong Kok
Low SES	Kowloon Bay Tin Shui Wai	Kwai Fong Ngau Tau Kok

of MTR stations[19]; both were classified under high SES in the current study. The other four stations selected had a median monthly household income under $HK50 000[18] with minimal economic activities, and were classified under low SES. Table 1 summarises the categorisation of these stations.

Data collection

The selected MTR stations were visited on three occasions – August 2018, February 2019 and March 2019 – for data collection, with the first two periods considered to reflect the mid-autumn and Chinese New Year seasonality effect, while the March collection was considered as a non-seasonal period. Photos and videos of all advertisements located in the MTR station area (escalator, platform, track-side, shops, paid and unpaid area and outside of stations, according to the official MTR station map) were taken. For digital promotion, an average of roughly 3 min of video was taken from each screen.

Data coding

To examine the characteristics of advertisements in the selected MTR stations, a coding protocol was developed with reference to the International Network for Food and Obesity/Non-Communicable Diseases Research, Monitoring and Action Support (INFORMAS) outdoor advertisement protocol[20] (see Appendix 1 in the online supplementary material). F&B were categorised into three groups – (i) core and healthy, (ii) non-core and unhealthy (F&B with high added sugars, saturated and/or trans-fat, salt or alcohol), and (iii) seasonal and special – according to the INFORMAS protocol with modifications to adapt to the local food culture. For example, the 'seasonal and special' category was made for traditional Chinese medicine and their processed products, which is rarely promoted in Australia and European countries, and for festival-related F&B, including mooncakes and Chinese New Year cake (Niangao). Since it is common in Hong Kong to advertise multiple products in a single advertisement, the number of F&B in a particular advertisement was also documented, and the healthiness of each product was individually determined and reported. The full breakdown of types of food products advertised in each of the data collection period, stratified by MTR stations, is provided in Appendices 2–4 in the online supplementary material.

Table 2 Number and proportion of advertisements in selected mass transit railway (MTR) stations

	Number of advertisements											
	August 2018			February 2019			March 2019			Total		
		Food			Food			Food			Food	
MTR stations	Total n	n	%	Total n	n	%	Total n	n	%	Total n	n	%
High SES school zones												
HKU	381	31	8·1	370	31	8·4	362	17	4·7	1113	79	7·1
Kowloon Tong	288	59	20·5	655	88	13·4	669	47	7·0	1612	194	12·0
Subtotal	669	90	13·6	1025	119	11·6	1031	64	6·2	2725	273	10·0
Low SES school zones												
Kowloon Bay	161	35	21·7	195	39	20·0	200	14	7·0	556	88	15·8
Tin Shui Wai	181	8	4·4	218	26	11·9	240	18	7·5	639	52	8·1
Subtotal	342	43	12·3	414	65	15·9	440	32	7·3	1195	140	11·7
High SES non-school zones												
Mong Kok	551	94	17·1	621	49	7·9	579	30	5·2	1751	173	9·9
Sheung Wan	484	95	19·6	523	50	9·6	518	29	5·6	1525	174	11·4
Subtotal	1035	189	18·3	1144	99	8·7	1097	59	5·4	3276	347	10·6
Low SES non-school zones												
Ngau Tau Kok	119	22	18·5	153	19	12·4	152	8	5·3	424	49	11·6
Kwai Fong	149	19	12·8	130	18	13·8	165	15	9·1	444	52	11·7
Subtotal	268	41	15·3	283	37	13·1	317	23	7·3	868	101	11·6
Total	2314	363	15·7	2865	320	11·2	2885	178	6·2	8064	861	10·7
High SES	1704	279	16·4	2169	218	10·1	2128	123	5·8	6001	620	10·3
Low SES	610	84	13·8	696	102	14·7	757	55	7·3	2063	241	11·7
P_{SES}*	–	0·136		–	0·001		–	0·159		–	0·090	
School zones	1011	133	13·2	1438	184	12·8	1471	96	6·5	3920	413	10·5
Non-school zones	1303	230	17·7	1427	136	9·5	1414	82	5·8	4144	448	10·8
P_{School}†	–	0·003		–	0·006		–	0·439		–	0·692	

SES, socioeconomic status.
*P_{SES} tested using Fisher's exact test for difference between high v. low SES stations.
†P_{School} tested using Fisher's exact test for difference between stations in school zone v. non-school zone.

Statistical analysis

All statistical analyses were performed in SPSS (version 25; IBM Corp.). Fisher's exact test was used to test for differences in categorical outcomes, and one-way ANOVA was used to test for differences in the mean number of foods promoted per advertisement between high v. low SES and school zone v. non-school zone stations. A two-tailed $P < 0.05$ was considered statistically significant.

Results

Number of advertisements in selected mass transit railway stations

Table 2 shows the number of advertisements in the selected MTR stations for each period of collection along with the percentage of F&B advertisements. The total number of advertisements recorded was 8064, of which 10·7 % were food-related. In general, there were a higher proportion of F&B advertisements in the two seasonal periods (August 2018 and February 2019) compared with the non-seasonal period (March 2019). No statistically significant differences were observed between the mean percentage of F&B advertisements in high v. low SES stations (10·3 v. 11·7 %, $P = 0.090$) and school zone v. non-school zone stations (10·8 v. 10·5 %, $P = 0.692$).

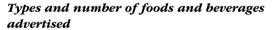### Types and number of foods and beverages advertised

Table 3 summarises the types of F&B advertised during the three data collection periods. Of the 1860 F&B being advertised in the selected MTR stations, more than half (54·5 %) were non-core and non-healthy foods, while only 43 % were core and healthy F&B. Seasonal and special foods accounted for only 2·5 % of food advertisements. Among core F&B, meat and meat alternatives were the most frequently advertised (17·3 %), followed by grains and bread (9·0 %) and healthy snacks (7·6 %). Sweet breads, cakes and pastries were the most frequently advertised non-core foods (18·3 %), followed by sugary drinks (8·8 %) and processed meat and meat alternatives (6·8 %).

Stations in high SES districts or school zones tended to advertise more unhealthy items (high v. low SES: 55·8 v. 50·8 %, $P = 0.049$; school v. non-school zones: 60·8 v. 49·3 %, $P < 0.001$). Compared with low SES stations, high SES stations had a significantly higher proportion of F&B advertisements for processed meats and meat alternatives (7·9 v. 4·0 %, $P = 0.003$), traditional Chinese dried seafood and tonics (1·5 v. 0·0 %, $P = 0.002$), and lower F&B advertisements for fruits and fruit products (1·6 v. 4·6 %, $P < 0.001$), milk and dairy products (0·5 v. 1·9 %, $P = 0.011$) and processed grains (0·9 v. 3·2 %, $P < 0.001$). On the other hand, stations in school zones had a higher

Table 3 Types of food products (n 1860) advertised stratified by socioeconomic statuses (SES) and school densities

| | Proportion of food advertisements | | | | | | | | | | | |
| | Total | | High SES | | Low SES | | | School zone | | Non-school zone | | |
Food sub-categories	n	%	n	%	n	%	P_{SES}*	n	%	n	%	P_{School}†
Core	804	43·2	557	41·7	247	47·1	0·037	309	37·4	495	47·9	<0·001
Grains and bread	167	9·0	118	8·8	49	9·4	0·719	68	8·2	99	9·6	0·328
Fruits and fruit products	45	2·4	21	1·6	24	4·6	<0·001	12	1·5	33	3·2	0·015
Vegetables and vegetable products	65	3·5	41	3·1	24	4·6	0·123	29	3·5	36	3·5	1·000
Milk and dairy products	17	0·9	7	0·5	10	1·9	0·011	4	0·5	13	1·3	0·091
Meat and meat alternatives	322	17·3	225	16·8	97	18·5	0·414	134	16·2	188	18·2	0·267
Oil high in MUFA or PUFA	0	0·0	0	0·0	0	0·0	–	0	0·0	0	0·0	–
Water	30	1·6	22	1·6	8	1·5	1·000	11	1·3	19	1·8	0·461
Sugar-free drinks	17	0·9	16	1·2	1	0·2	0·054	6	0·7	11	1·1	0·475
Healthy snacks	141	7·6	107	8·0	34	6·5	0·285	45	5·4	96	9·3	0·002
Non-core, unhealthy	1012	54·5	746	55·8	266	50·8	0·049	503	60·8	509	49·3	<0·001
Processed grains	29	1·6	12	0·9	17	3·2	<0·001	22	2·7	7	0·7	<0·001
Sweetened fruits and fruit products	0	0·0	0	0·0	0	0·0	–	0	0·0	0	0·0	–
Processed vegetables and vegetable products	0	0·0	0	0·0	0	0·0	–	0	0·0	0	0·0	–
Processed meat and meat alternatives	126	6·8	105	7·9	21	4·0	0·003	75	9·1	51	4·9	<0·001
High-fat meat and meat alternatives	124	6·7	93	7·0	31	5·9	0·470	49	5·9	75	7·3	0·263
Processed milk and dairy products	0	0·0	0	0·0	0	0·0	–	0	0·0	0	0·0	–
Oil high in saturated and/or trans-fat	0	0·0	0	0·0	0	0·0	–	0	0·0	0	0·0	–
Fast-food meals	32	1·7	22	1·6	10	1·9	0·694	10	1·2	22	2·1	0·152
High-fat/deep-fried snacks	18	1·0	16	1·2	2	0·4	0·121	10	1·2	8	0·8	0·352
High-sugar snacks	13	0·7	11	0·8	2	0·4	0·536	12	1·5	1	0·1	<0·001
Other food/sauces high in fat and/or salt	111	6·0	87	6·5	24	4·6	0·128	46	5·6	65	6·3	0·555
Full-fat drinks, ice creams and desserts	36	1·9	26	1·9	10	1·9	1·000	19	2·3	17	1·6	0·316
Sweet breads, cakes and pastries	340	18·3	243	18·2	97	18·5	0·894	192	23·2	148	14·3	<0·001
Sugar-sweetened drinks	164	8·8	119	8·9	45	8·6	0·856	54	6·5	110	10·6	0·002
Alcohol	19	1·0	12	0·9	7	1·3	0·443	14	1·7	5	0·5	0·018
Seasonal and special foods	44	2·4	33	2·5	11	2·1	0·736	15	1·8	29	2·8	0·171
Traditional Chinese dried seafood and tonic	20	1·1	20	1·5	0	0·0	0·002	0	0·0	20	1·9	<0·001
Traditional Chinese medicine products	3	0·2	2	0·1	1	0·2	1·000	1	0·1	2	0·2	1·000
Seasonal foods and/or items for special purposes	21	1·1	11	0·8	10	1·9	0·053	14	1·7	7	0·7	0·047
Total	1860	100	1336	100	524	100	–	827	100	1033	100	–

*P_{SES} tested using Fisher's exact test for difference between high v. low SES stations.
†P_{School} tested using Fisher's exact test for difference between stations in school zone v. non-school zone.

proportion of F&B advertisements for processed grains (2·7 v. 0·7 %, $P < 0.001$), processed meat and meat alternatives (9·1 v. 4·9 %, $P < 0.001$), high-sugar snacks (1·5 v. 0·1 %, $P < 0.001$), sweet breads (23·2 v. 14·3 %, $P < 0.001$), alcohol (1·7 v. 0·5 %, $P = 0.018$) and seasonal food and/or items for special purposes (1·7 v. 0·7 %, $P = 0.003$), and lower F&B advertisements for fruits and fruit products (1·5 v. 3·2 %, $P = 0.015$) and traditional Chinese dried seafood and tonic (0·0 v. 1·9 %, $P < 0.001$).

The majority of F&B advertisements promoted only one product (60·6 %), while around 15 % promoted four or more products in a single advertisement. There was no significant difference in the mean ± SD of products

promoted per advertisement between low v. high SES stations (1·8 ± 1·1 v. 1·8 ± 1·1, $P_{ANOVA} = 0.731$), while F&B advertisements in school zones promoted slightly more products than those in non-school zones (1·9 ± 1·2 v. 1·7 ± 1·1, $P_{ANOVA} = 0.043$).

Marketing strategies used in food and beverage advertisements

The marketing strategies used in F&B advertisements are summarised in Table 4. More than one-third of advertisements did not employ any of those persuasive marketing techniques examined (36·4 %), while >30 % utilised festival-related strategies (31·7 %), and about 14 % used

Table 4 Persuasive marketing strategies used in food advertisements

MTR station	Total n	Models (people other than celebrities)	Celebrities	Cartoon characters	Awards or sales statistics	Festival-related	Discounts	Limited edition	Game or lucky draw	Loyalty programme	None of these
		Persuasive marketing strategies used (%)									
High SES school zones											
HKU	79	12·7	3·8	0·0	1·3	44·3	8·9	0·0	2·5	0·0	26·6
Kowloon Tong	194	16·0	6·7	0·5	0·5	29·9	4·6	0·0	3·1	0·0	38·7
Subtotal	273	15·0	5·9	0·4	0·7	34·1	5·9	0·0	2·9	0·0	35·2
Low SES school zones											
Kowloon Bay	88	12·6	2·3	1·1	0·0	52·9	3·4	0·0	1·1	1·1	25·3
Tin Shui Wai	52	2·0	17·6	0·0	0·0	41·2	7·8	0·0	0·0	0·0	31·4
Subtotal	140	8·7	8·0	0·7	0·0	48·6	5·1	0·0	0·7	0·7	27·5
High SES non-school zones											
Sheung Wan	174	15·7	4·1	0·6	0·0	25·0	11·0	0·0	4·1	0·0	39·5
Mong Kok	173	16·8	2·3	0·6	1·2	25·4	12·7	1·2	2·3	0·0	37·6
Subtotal	347	16·2	3·2	0·6	0·6	25·2	11·9	0·6	3·2	0·0	38·6
Low SES non-school zones											
Kwai Fong	52	7·7	3·8	0·0	0·0	13·5	17·3	1·9	0·0	0·0	55·8
Ngau Tau Kok	49	12·2	8·2	0·0	0·0	36·7	4·1	0·0	6·1	0·0	32·7
Subtotal	101	9·9	5·9	0·0	0·0	24·8	10·9	1·0	3·0	0·0	44·6
Total	861	13·9	5·1	0·5	0·5	31·7	8·8	0·4	2·7	0·1	36·4
High SES	620	15·7	4·4	0·5	0·6	29·1	9·2	0·3	3·1	0·0	37·1
Low SES	241	9·2	7·1	0·4	0·0	38·5	7·5	0·4	1·7	0·4	34·7
P_{SES}*	–	0·015	0·120	1·000	0·581	0·009	0·501	1·000	0·347	0·279	0·580
School zones	413	12·9	6·6	0·5	0·5	38·9	5·6	0·0	2·2	0·2	32·6
Non-school zones	448	14·8	3·8	0·4	0·4	25·1	11·7	0·7	3·1	0·0	39·9
P_{School}†	–	0·431	0·087	1·000	1·000	<0·001	0·002	0·250	0·408	0·480	0·028

MTR, mass transit railway; SES, socioeconomic statuses.

*P_{SES} tested using Fisher's exact test for difference between high $v.$ low SES stations.

†P_{School} tested using Fisher's exact test for difference between stations in school zone $v.$ non-school zone.

models. High SES stations had a higher proportion of F&B advertisements using models (15·7 *v.* 9·2 %, $P = 0.015$) and a lower proportion of advertisements using festival-related strategies (29·1 *v.* 38·5 %, $P = 0.009$) compared with low SES stations. A higher proportion of F&B advertisements in school zone stations utilised festival-related strategies (38·9 *v.* 25·1 %, $P < 0.001$), and a lower proportion of them offered discounts (5·6 *v.* 11·7 %, $P = 0.002$) than non-school zone stations. More F&B advertisements in non-school zone stations did not utilise any of those persuasive marketing techniques examined (39·9 *v.* 32·6 %, $P = 0.028$).

Discussion

This is the first study examining F&B advertisements in an MTR setting and the relationship among F&B advertising characteristics, SES and school density. Our results showed that F&B accounted for around 11 % of advertisements in the selected MTR stations, and >54 % of these were for non-core, unhealthy F&B. SES did not appear to strongly influence the placement of junk F&B advertising in Hong Kong, but more non-core F&B advertisements were seen in stations near school zones.

It is concerning to see that more than half of F&B advertisements recorded were promoting unhealthy F&B. Topping the list were items high in saturated fat, sugars and/or salt such as sugar-sweetened drinks, sweet breads, cakes and pastries and processed meat and alternatives, while healthy foods such as fruit and vegetables were infrequently promoted. This directly contradicts the WHO recommendation for reducing the marketing of these F&B items to reduce the consumption of unhealthy foods[21].

We also examined the relationship among SES, school density and types of F&B advertised. Contrary to two Australian studies where low SES areas were found to have a high proportion of food advertisements promoting unhealthy F&B[15,22], our results showed that stations in high SES districts had a higher average proportion of unhealthy F&B promotions than their low SES counterparts. Fruits and fruit products were more frequently promoted in low SES stations, while less processed meats were advertised. This suggests that the manufacturers of F&B may be considering factors other than just the SES of an area when making decisions on placing advertisements. On the other hand, stations in areas with a high density of schools tended to have a higher proportion of junk food advertisements, similar to the results of previous studies in other cities such as Vienna, Ulaanbaatar in Mongolia and Manila[23,24].

District-specific F&B promotions were prevalent in the selected stations, which could be due to the unique, high-density nature of the MTR and Hong Kong town planning in general. Some festival F&B promotions organised in a particular district were found during data collection.

Some of the advertisements in Sheung Wan were promoting restaurants out of Hong Kong due to a close proximity to Hong Kong–Macau Pier. Also, fast-food restaurant promotions found in MTR stations generally point to large shopping centres nearby. These results highlight the unique nature of the advertising scene in Hong Kong MTR, which should be taken into account when formulating regulations on junk food advertising.

Another interesting finding is the infrequent use of common persuasive marketing strategies in advertisements. Studies have found that persuasive marketing strategies through television have a strong effect on influencing purchasing behaviour[25]. While the general out-of-home environment may not be comparable with television, since the F&B products advertised in Hong Kong MTR stations may not be immediately available for purchase, an element of persuasiveness was assumed to exist in the advertisement. Surprisingly, more than one-third of F&B advertisements in the selected Hong Kong MTR stations did not utilise any of those persuasive marketing techniques examined. Our results may also not be generalisable due to the high proportion of advertisements using festival-related strategies. Apart from these, the most frequently used persuasive marketing strategies were models, discounts and celebrities. Cartoon characters were rarely used, which echoes our observation that marketing of unhealthy F&B products in Hong Kong MTR stations may not be directed at children and/or adolescents alone but at all patrons of the station to maximise the promotional effects.

We also observed a strong seasonality effect on F&B advertising in Hong Kong MTR stations, where more F&B advertisements were seen during the pre-mid-autumn festival and Chinese New Year season. The first attempt of recording advertisements was made in August 2018, which is a common promotion period for mid-autumn festival-related F&B products, while the second attempt was completed in February 2019, during which the Chinese New Year-related F&B products were commonly advertised. In most cases, F&B were only promoted in Hong Kong MTR stations due to festivals or special occasions or when a new product was being launched, which highlights the transient nature of Hong Kong outdoor advertising.

In Hong Kong, there is no relevant regulation regarding F&B promotion to children. Based on our finding that common persuasive marketing strategies were infrequently used in the MTR setting, when developing F&B advertising-related strategies, especially those specific to the MTR environment, policymakers in Hong Kong should consider a universal ban of junk food advertising rather than banning only persuasive marketing strategies targeting children/adolescents. A previous study has suggested that banning junk food advertisements can reduce the consumption of these unhealthy F&B[26]. In a pioneering example, Transport for London restricted all junk food advertisements in London underground stations, train, tram

and bus stops in February 2019, such that all promotions of F&B considered high in salt, sugar and fat are not permitted[27]. The effect of such ban on curbing unhealthy food purchase and consumption is yet to be evaluated.

Our results should be interpreted with several limitations in mind. First, the MTR stations included were not randomly selected, and some of them were interconnected with other districts. The results may, therefore, not be generalisable, and our conclusions related to SES should be interpreted with caution. In future studies, more parameters should be considered when selecting stations to be audited. These include connectivity to other stations, as well as types and number of patrons (residents, employees and tourists). Second, as Hong Kong is a densely populated city with no clear boundary between industrial, commercial, residential and school areas – that is, all four could co-exist near a particular MTR station, hence affecting the patronage of the station – we were unable to rule out the potential confounding effect from non-school patronage, although the differences between school *v.* non-school zones appeared to be consistent across our sample. Future studies should take into account other factors that affect the patronage of MTR stations when clustering the stations for analysis. Third, we did not document other forms of persuasive marketing strategies such as nutritional claims, claims related to convenience or depiction of families and children, although a *post hoc* audit of pictures showed these were infrequently used in the sample. Lastly, the INFORMAS advertising protocol is designated for western countries. There is no relevant coding system for Chinese cuisine, and the complexity of identifying Chinese cuisine and ingredients complicates categorisation. Such a limitation can be tackled by developing a Chinese food-coding system. In addition, irregular but frequent rearrangement of advertisements was a significant problem during data collection, where unhealthy F&B appeared for a short period randomly, and compelling seasonal factors may result in an inconsistency of data collected at different periods. These could be minimised if regular data collection is performed, but this would be time-consuming. Furthermore, the high variety of advertisements in Hong Kong is problematic in the coding process. Some of the advertisements were non-food-related but used non-core and unhealthy F&B as background. This might indirectly influence the audience, but we were unable to assess this effect.

Conclusions

The current study provides important evidence of the high prevalence of unhealthy F&B advertising in Hong Kong MTR stations regardless of SES and school density. Surprisingly, persuasive marketing strategies were infrequently used. This suggests that a ban on unhealthy F&B advertising around schools or the use of persuasive marketing strategies alone would be ineffective in Hong Kong. To align with the WHO recommendation that children should be protected from the influence of outdoor advertisements, a universal ban of junk food advertising should be enacted in Hong Kong.

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Supplementary material

For supplementary material accompanying this paper, visit https://doi.org/10.1017/S136898002000083X

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