



THE EFFECT OF MARKETING OF UNHEALTHY FOOD AND BEVERAGES TO CHILDREN

**HEALTH TECHNOLOGY ASSESSMENT SECTION
MEDICAL DEVELOPMENT DIVISION
MINISTRY OF HEALTH MALAYSIA
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Please contact: htamalaysia@moh.gov.my, if you would like further information.

Health Technology Assessment Section (MaHTAS),
Medical Development Division
Ministry of Health Malaysia
Level 4, Block E1, Precinct 1
Government Office Complex
62590 Putrajaya

Tel: 603 88831229

Fax: 603 8883 1230

Available at the following website: <http://www.moh.gov.my>

Prepared by:
Ros Aziah Binti Mohd Rashid
Senior Assistant Director
Health Technology Assessment Section (MaHTAS)
Medical Development Division
Ministry of Health Malaysia

Reviewed by:
Dr Junainah Binti Sabirin
Public Health Physician
Deputy Director
Health Technology Assessment Section (MaHTAS)
Medical Development Division
Ministry of Health Malaysia

External reviewers:
Noriza Zakaria
Principal Assistant Director
Nutrition Division
Ministry of Health Malaysia

Prof. Dr. Tilakavati Karupaiah
Dietetic Programme
Faculty of Health Science
Universiti Kebangsaan Malaysia

Dr. Salleh bin Zakaria
Oral Health Technology Section
Oral Health Division
Ministry of Health Malaysia

DISCLOSURE

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EXECUTIVE SUMMARY

Background

World Health Organization (WHO) has defined marketing as any form of commercial communication or message that designed to has the effect of increasing the recognition, appeal or consumption of particular products and services. It comprises anything that acts to advertise otherwise promote a product or service.

Children are regularly exposed to advertising and marketing of unhealthy food and beverages through television, internet, magazines, schools, product placements, video games, cell phones, and other means. Unfortunately, most of these products have excessive amounts of added sugar, salt, and fat, and inadequate amounts of fruits, vegetables and whole grains.

Unhealthy food is individual or composite food and beverages that are high in energy, sodium, sugar and/or low in other beneficial nutrients such as protein, vitamins, minerals, fibres, non-nutrient compounds. These food and beverages mostly have strong salty and/or sweet taste and rich mouthfeel from fat.

In Malaysia, non-core food [high in undesirable nutrients such as; high fat, high refined sugars and high salt (considered as unhealthy food)] and sugary drinks are predominant in television (TV) food advertising, and rates are greater during school holidays compared to normal days. The majority of these sugary drinks were advertised by multinational companies, and this observation warrants regulatory attention.

Under the resolution of World Health Assembly (WHA63.14), WHO had come out with a set of recommendations on the marketing of food and non-alcoholic beverages to children in year 2010. In Malaysia, there is a Malaysian Food and Beverages Industry Responsible Advertising to Children Initiative (Malaysian Pledge) participated by 12 companies. The pledge is an initiative to demonstrate the companies' commitment for a responsible marketing of unhealthy food and beverages to children < 12 years old.

However, there remains a question regarding the effect of marketing of unhealthy food and beverages to children. This technology review aims to evaluate the evidence regarding this, following a request from the Director of Nutrition Division, Ministry of Health.

Objective/aim

The objective of this technology review was to evaluate the effect of marketing (via all medium such as TV, radio, internet or magazine) of unhealthy food and beverages to children.

Results and conclusions

A total of 1104 records were identified through the Ovid interface and PubMed, and 42 were identified from other sources. There were 15 articles included in this review: four were systematic reviews, one pre- and post-intervention study and 10 were cross sectional studies. The studies were conducted in Canada, Australia, Malaysia, Sweden, New Zealand, United Kingdom, Italy, India, Greece, Mexico and Turkey.

There was fair to good level of retrievable evidence to suggest that unhealthy food and beverages marketing increased dietary intake and food consumption. Evidence suggest that the effect was more significant in children and with increased frequency of TV viewing.

There was fair to good level of retrievable evidence to suggest that unhealthy food and beverages marketing increased children preference towards advertised food. The effect was more significant among younger age group of children and with increased frequency of TV viewing.

There was limited fair level of retrievable evidence to suggest that exposure to unhealthy food and beverages marketing increased desire and frequency to consume food products, increased perception, increased recognition, increased purchase request and increased brand knowledge among children.

There was also limited fair level of retrievable evidence to suggest that frequency of TV viewing (unhealthy food and beverages advertisement) and logo recognition was associated with BMI and dental caries.

Methods

Electronic databases were searched through the Ovid interface: Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE® 1946 to Present, EBM Reviews - Cochrane Central Register of Controlled Trials - January 2017, EBM Reviews - Cochrane Database of Systematic Reviews - 2005 to February 2017, EBM Reviews - Health Technology Assessment – 1st Quarter 2017, EBM Reviews – NHS Economic Evaluation Database 1st Quarter 2017. Searches were also run in PubMed database and U.S. Food and Drug Administration (USFDA) website. Google and Google Scholar was also used to search for additional web-based materials and information. Nutrition Division, Ministry of Health also submitted documents and articles regarding this topic.

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1. BACKGROUND

World Health Organization (WHO) has defined marketing as any form of commercial communication or message that designed to has the effect of increasing the recognition, appeal or consumption of particular products and services. It comprises anything that acts to advertise otherwise promote a product or service.¹

World Health Organization definition of child is a person 19 years and younger unless law defines a person to be an adult at earlier age. Definition of a child is a critical part in any regulation concerning marketing to children. Although often assumed to be an issue of age, many regulations do not actually define upper age limits. In addition, there is some debate about the applicability of age as a determinant. When specified in national broadcast legislation, the definition of a child typically ranges from under 12 years of age to under 16 years. Thus even if a regulation on marketing to children is similar within a group of countries, it may apply to different age groups. Furthermore, regulations on different forms of marketing (e.g. advertising and sales promotions) in the same country may apply to different age groups.²

Food marketing creates demand for both highly palatable food and, notably, highly appealing brands. They are designed to boost brand recognition, sales, and loyalty, more often for unhealthy, high-calorie food.³

Children are regularly exposed to advertising and marketing of unhealthy food and beverages through television (TV), internet, magazines, schools, product placements, video games, cell phones, and other means. Unfortunately, most of these products have excessive amounts of added sugar, salt, and fat, and inadequate amounts of fruits, vegetables and whole grains.³

Unhealthy food is individual or composite food and beverages that are high in energy, sodium, sugar and/or low in other beneficial nutrients such as protein, vitamins, minerals, fibres, non-nutrient compounds. These food and beverages mostly have strong salty and/or sweet taste and rich mouthfeel from fat.⁴

In Malaysia, non-core food [high in undesirable nutrients such as; high fat, high refined sugars and high salt (considered as unhealthy food)] and sugary drinks are predominant in TV food advertising, and rates are greater during school holidays compared to normal days. The majority of these sugary drinks were advertised by multinational companies, and this observation warrants regulatory attention.⁵

Food advertising frequency during children's prime time TV varied between TV channels and increased during weekends, school vacation and Ramadhan. It was found that advertisements of snacks were screened five times more frequently than fast food and were the major component of food advertising on children's TV in Malaysia. The nutritional content of these snacks are a major concern as they are high in calories, sodium and salt per 100g of consumed food.⁶

Under the resolution of World Health Assembly (WHA63.14), WHO had come out with a set of recommendations on the marketing of unhealthy food and non-alcoholic (high in sugar) beverages to children in year 2010. In Malaysia, there is a Malaysian Food and Beverages Industry Responsible Advertising to Children Initiative (Malaysian Pledge) participated by 12 companies. The pledge is an initiative to demonstrate the companies' commitment for a responsible marketing of unhealthy food and beverages to children < 12 years old.

However, there remains a question regarding the effect of marketing of unhealthy food and beverages to children. This technology review aims to evaluate the evidence regarding this, following a request from the Director of Nutrition Division, Ministry of Health.

2. OBJECTIVE / AIM

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3. TECHNICAL FEATURES

The term marketing refers to commercial activities designed to increase brand recognition, appeal and ultimately purchase of products and services. It traditionally relates to four broad classes of activities, including product, price, place and promotion.⁷

From the WHO nutrient profile model for South-East Asia Region, the nutrient for total fat, saturated fat, total sugars, added sugars and sodium have been set. A food product is classified as excessive in one or more critical nutrients if its relative nutrient content is higher than the corresponding maximum level recommended in the salt or sugars guidelines and the population nutrient intake goals of WHO unless indicated otherwise:⁴

- (i) Sodium thresholds are based on the rationale that if the ratio between the amount of sodium (mg) in any quantity of the product and the energy content (kcal) is equal to or higher than 1:1, the product is considered excessive in sodium. The ratio is derived from a maximum recommended daily intake of 2000 mg of sodium,

the WHO limit for adults, on an average total daily energy intake of 2000 kcal).The threshold is set at 1 mg sodium:1 kcal energy or lower wherever possible.

- (ii) Sugar thresholds are based on the rationale that a product is considered excessive in free sugars, if in any given quantity of the product, the amount of energy (kcal) from free sugars [free sugars (g) x 4 kcal] is equal to or higher than 10% of the total energy (kcal) for the product. A lower threshold of 5% is used for sugar sweetened beverages.
- (iii) Total fat is considered excessive, if in any given quantity of the product the amount of energy (kcal) from total fats [total fats (g) x 9 kcal] is equal to or higher than 30% of the total energy (kcal) and excessive in saturated fats, if in any given quantity of the product the amount of energy (kcal) from saturated fats [saturated fats (g) x 9 kcal] is equal to or higher than 10% of the total energy (kcal).



Figure 1: Persuasive food marketing targeting children

4. METHODS

4.1. Searching

Electronic databases were searched through the Ovid interface: Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE® 1946 to Present, EBM Reviews - Cochrane Central Register of Controlled Trials - January 2017, EBM Reviews - Cochrane Database of Systematic Reviews - 2005 to February 2017, EBM Reviews - Health Technology Assessment – 1st Quarter 2017, EBM Reviews – NHS Economic Evaluation Database 1st Quarter 2017. Searches were also run in PubMed database and U.S. Food and Drug Administration (USFDA) website. Google and Google Scholar was also used to search for additional web-based materials and information. Additional articles were identified from reviewing the references of retrieved articles. Last search was conducted on 5th March 2017. Additional articles were retrieved from the documents submitted by Nutrition Division, Ministry of Health.

Appendix 1 showed the detailed search strategies.

4.2. Selection

A reviewer screened the titles and abstracts against the inclusion and exclusion criteria and then appraise the full text articles for final article selection.

The inclusion and exclusion criteria were:

Inclusion criteria

Population	Children (≤ 19 years old as defined by WHO)
Interventions	Unhealthy food and beverages marketing
Comparators	Nil
Outcomes	Effect on food intake, knowledge, attitude, perception and health effects among children exposed to unhealthy food and beverages marketing
Study design	Systematic Review (SR), Randomised Controlled Trial (RCT) or non-randomised controlled trial, Health Technology Assessment (HTA), economic evaluation study, Cohort study, pre- and post-intervention study, cross sectional study, case series
	English full text articles

Exclusion criteria

Study design	Case report, studies conducted in animals, narrative reviews
	Non English full text articles

Relevant articles were critically appraised using Critical Appraisal Skills Programme (CASP) and graded according to US/Canadian preventive services task force (Appendix 2). Data were extracted and summarised in evidence table as in Appendix 3.

5. RESULTS AND DISCUSSION

A total of 1104 records were identified through the Ovid interface and PubMed, and 42 were identified from other sources (submitted by Nutrition Division, Ministry of Health and references of retrieved articles). After removal of 290 irrelevant or duplicates, 856 records were screened and 792 were excluded. Of these, 87 relevant abstracts were retrieved in full text. After reading, appraising and applying the inclusion and exclusion criteria to the 87 full text articles, 15 full text articles were included and 72 full text articles were excluded. The articles were excluded due to the study was already included in systematic review and meta-analysis ($n=17$), irrelevant study design ($n=33$), irrelevant population ($n=6$), irrelevant outcome ($n=16$). Flow chart of study selection is shown in figure 2.

The 15 full text articles finally selected for this review comprised of four systematic reviews, one pre- and post-intervention study and 10 cross sectional studies. The studies were conducted in Canada, Australia, Malaysia, Sweden, New Zealand, United Kingdom, Italy, India, Greece, Mexico and Turkey.

Marketing medium was not restricted during search process. However, most of the studies retrieved were on TV and internet advertisement of unhealthy food and beverages.

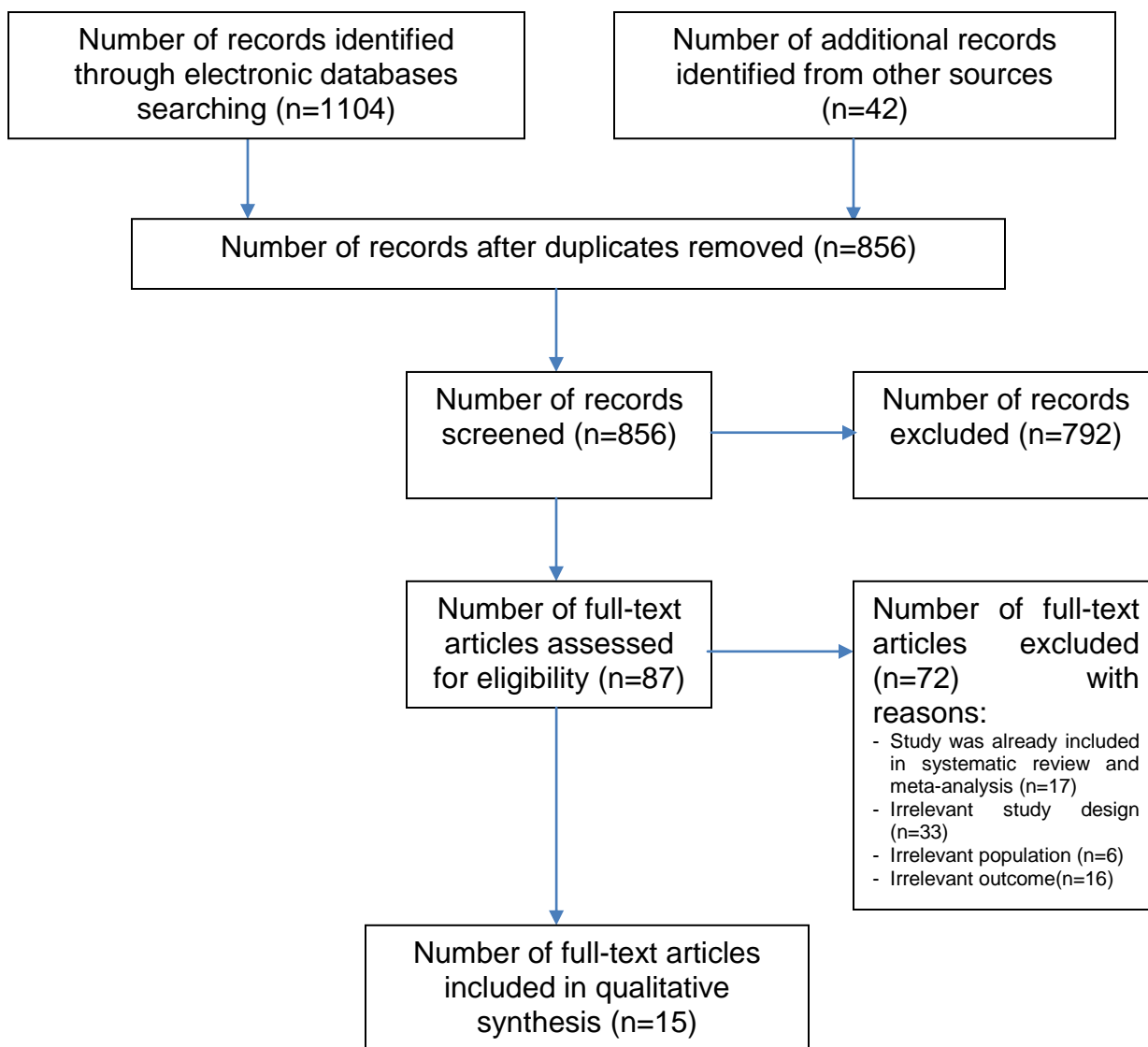


Figure 2: Flow chart of study selection

Risk of bias

One of the tools that are being used by MaHTAS to assess the risk of bias is the CAPS checklist which consist of eight critical appraisal tools

designed for SR, RCT, cohort studies, case control studies, economic evaluations, diagnostic accuracy studies, qualitative studies and clinical prediction rule. This is achieved by answering a pre-specified question of those criteria assessed and assigning a judgement relating to the risk of bias as either “Yes” indicates low risk of bias, “No” indicates high risk of bias, and “Can’t tell” indicates unclear or unknown risk of bias.

The assessment of risk of bias revealed that the two SR were considered to have low risk of bias meanwhile one SR indicates unknown risk of bias and another one SR indicate high risk of bias.

Table 1: Assessment of risk of bias of systematic review (CASP)

Criteria assessed	Authors look for the right type of papers?	Selection of studies (all relevant studies included?)	Assessment of quality of included studies?	If the results of the review have been combined, is it reasonable to do so (heterogeneity)?
Sideghirad B et al.	+	+	+	+
Boyland EJ et al.	+	+	+	+
Gregori D et al.	?	?	+	?
Bacardi-Gascon M and Jimenez-Cruz A	?	-	-	-

5.1. FOOD INTAKE

A systematic review was conducted in Canada by Sadeghirad B et al. to assess the effects of unhealthy food and beverage marketing on dietary intake and dietary preference among children two to 18 years old. They searched systematically randomised controlled trials that assessed the effects of unhealthy food and beverage marketing compared with non-dietary advertisement or no advertisement in children. Meta-analysis was conducted separately for dietary intake [in kilocalories (kcal) and grammes] and preference towards unhealthy food and beverages using random-effects model. A total of 29 eligible studies were identified (n=5,814). Most of the studies examined the impact of TV advertising (12 studies), followed by licenced characters/logos (nine studies), advergames (six studies) and advertising in magazines/booklets (two studies). A total of 17 studies were included in the meta-analysis of dietary preference and nine studies were included in meta-analysis of dietary intake. From the systematic review they found that there was a significant increase in dietary intake of 30.4 kcal [(95%CI: 2.9, 57.9), p=0.003, I²=72.0%] favouring exposure to unhealthy dietary advertising versus non-dietary advertising. There was also a significant increase of dietary intake in grammes of 4.8g [(95%CI: 0.8, 8.8), p=0.018, I²=31.6%] among those exposed to unhealthy dietary advertising.^{8, level I}

Boyland EJ et al. conducted a systematic review in United Kingdom (UK) to examine the evidence regarding the relation between acute exposure to experimental unhealthy food advertising and food consumption. They searched systematically for relevant publications that manipulated acute advertising exposure [including at least one condition in which participants were exposed to unhealthy food (chips, chocolate, dessert, candy, popcorn, crackers and cookies, buffet with high fat or sugar, pizza and fast food) or non-alcoholic beverage (soda) advertising on TV or the Internet and another condition with a non-food advertisement or a no-advertisement control] regardless the age of participants. The articles also formally measured food or non-alcoholic beverage intake, which was assessed as either energy intake or the quantity of item consumed. The standardized mean difference (SMD) in food intake was calculated between unhealthy food advertising and control conditions. Total of 22 eligible publications were included in the review. Eighteen studies measured the impact of television advertisement and four were on Internet advertisements. However, only 18 articles were included in the meta-analysis (seven articles on adults and 11 articles on children). They found that, there was a small to moderate effect size for advertising on food consumption with participants eating more food after exposure to food advertising than after control conditions [SMD: 0.37 (95% CI: 0.09, 0.65), $p=0.01$, $I^2 = 98\%$]. Subgroup analyses showed that the experiments with adult participants provided no evidence of an effect of advertising on intake [SMD: 0.00 (95% CI: -0.20, 0.20), $P = 1.00$, $I^2 = 8\%$]. However, there was a significant effect of moderate size for children, whereby food advertising exposure was associated with greater food intake [SMD: 0.56, (95% CI: 0.18, 0.94), $P = 0.003$, $I^2 = 98\%$]. The authors concluded that acute exposure to food advertising increases food intake in children but not in adults.^{9, level I}

A systematic review was conducted by Gregori et al. in Italy to review evidence on experimental research focused on the relationship between exposure to TV advertising and actual food intake in children from four to 12 years old. They systematically searched for RCTs that assessed the effect of direct exposure to TV food advertising compared to non-food commercial over the actual energy intake of children. There were seven studies out of 2166 fulfilled the inclusion criteria and were included in the review. They found that total energy intake was higher after exposure to food advertising was reported in two studies (Halford et al. 2007 and Halford et al. 2008). A relevant higher consumption of snacks during food advertising was also observed in two other studies (Harris et al. 2009 and Dovey et al. 2011). Meanwhile, one study (Anschutz et al. 2009) reported that there was a potential existence of a gender effect, demonstrating that snack intake was different among girls and boys. Indeed, food intake in boys was higher when watching food advertising, whereas snack intake in

girls was slightly lower when exposed to food advertising. Halford et al. (2004) found that major consumption of snacks among obese and overweight children, both in the food advertising group and in non-food one. The authors concluded that the association between TV advertising and energy intake is based on a very limited set of randomised researches lacking a solid ground of first-level evidence. More RCTs addressing the relationship between TV advertising and food intake in children are required to deepen knowledge on causal relationships and therefore to set the root for incisive prevention.^{10, level II-1}

Bacardi-Gascon M and Jimenez-Cruz A conducted a systematic review in Mexico to analyse the studies exploring food advertising in TV conducted in Latin-American countries and United State of America (USA) geared to Hispanics. They conducted systematic search of food advertising directed to children in TV in Latin-America countries and Hispanics living in the USA, published from January 1985 to January 2015. Total of 23 studies were found and ten of the studies focused on unhealthy food, 12 on unhealthy and healthy food and others were not classified. They found that most of the food advertisement were geared toward children but only two studies reported on food consumption. Bacardi-Gascon M et al. (2013) reported that there was an association between the frequency of food advertised and the food consumption of those food by the mother ($r = 0.79$, $p = 0.0001$) and their children ($r = 0.79$, $p = 0.0001$). Meanwhile, Diaz-Ramirez M et al. (2013) also reported that there was an association between the frequency of food advertised and the food consumption of those food by the mother ($r = 0.73$, $p = 0.0001$) and their children ($r = 0.66$, $p = 0.0001$).^{11, level II-2}

A cross sectional study was conducted by Kelly B et al. in Australia to quantify the impact of children's exposure to TV food advertising on usual dietary patterns. A total of 417 Australian children aged 10 to 16 years old participated in an online survey, which assessed television viewing habits and consumption of 12 frequently advertised unhealthy food or drinks. Consumption of those food or drinks was dichotomized (less weekly, weekly, or more) and summed (one point for each item consumed weekly or more) to give cumulative consumption score. After adjusted for age and socioeconomic status, they found that there was strong evidence of an increase in unhealthy food score of 0.048 [standard error (SE) =0.01], $p < 0.001$, unhealthy drink score of 0.019 [(SE=0.007), $p < 0.01$] and unhealthy food/drink combine score of 0.067 [(SE= 0.015), $p < 0.001$] with increasing each hour of commercial television viewing per week. The authors concluded that the link between television viewing and poor diet was strongest for children who watched the most commercial TV and those who were actually exposed to advertisement embedded within programmes.^{12, level II-3}

A secondary data analysis was conducted in New Zealand by Utter J et al. to explore how time spent watching television (TV) was associated with the dietary behaviours of New Zealand children and young adolescents. The analysis was based on data collected in the 2002 National Children's Nutrition Survey (CNS02) that was a cross-sectional population survey. A total of 3275 children aged five to 14 years participated in the survey. They were classified as children (five to 10 years) and adolescents (ages 11 to 14 years). As predetermined, the most commonly advertised food in New Zealand were snack food, sweet snacks, sweet drinks and fast food, and the least commonly advertised food were fruits, vegetables and milk. From the secondary analysis they found that children (five to 10 years old) who watched two or more hours of TV per day were more than twice as likely to be high consumers of carbonated soft drinks [Odds ratio (OR) 2.2 (95%CI: 1.2, 4.0) p=0.029], hamburgers [OR 2.0 (95%CI: 1.2, 3.2) p=0.016] and French fries [OR 2.1 (95%CI: 1.4, 3.1) p<0.001] than children watching less than an hour of TV daily. Meanwhile, for adolescents (11-14 years old) who watched one or more hours of TV per day were more than twice as likely to be high consumers of carbonated soft drinks [OR 2.3 (95%CI: 1.2, 4.4), p=0.036] and chocolate sweets [OR 2.2 (95%CI: 1.4, 3.6), p=0.004] than adolescents watching TV for less than an hour. ^{13, level II-3}

Arnas YA conducted a cross sectional study in Turkey to examine TV advertisements and children's food consumption while watching TV and their desire to purchase goods that they see on TV advertisements. The study was conducted in two parts. First part was on content analysis of the TV advertisements during children's programmes on Saturday and Sunday morning. Second part of the study focused on children behaviour's while watching TV advertisements and their purchasing requests during shopping, in children aged three to eight years old through a questionnaire given to 347 parents. From the study they reported that majority of the children (60.8%) consumed fruits, 44.1% consumed soft drink, 36.6% consumed corn or nuts, 33.7% consumed cake, 33.4% consumed chips and 28.8% consumed chocolate/candy while watching TV. ^{14, level II-3}

5.2. DESIRE AND FREQUENCY TO CONSUME FOOD PRODUCTS

A cross-sectional survey was conducted in Australia by Pettigrew S et al. to examine the impact of TV and internet food advertising on Australian parents and children. Total of 2604 children aged eight to 14 years and their parents were involved (n=1302 children, n=1302 parent). One parent and one child questionnaire were administered to each group [featured same four products in the form of television food advertisements, internet advertisements and still pictures advertisement (as control) respectively]. After a single exposure to each advertisement they found that, both parents and children desire to consume the product were stronger among

those in the advertising exposure conditions although the effect was significant only among the parents [Mean Difference (MD) = 0.36, ($p < 0.01$) for TV score (mean=6.63) and MD=0.32 ($p < 0.01$) for internet score (mean=6.59) compared to control (mean=6.27)]. There was also significant differences in perceived appropriate consumption frequency by exposure were found for parents. However, the effect in children was limited to those who were exposed to the Internet advertisements only [MD= 0.34 ($p < 0.01$) between internet score (mean=6.13) compared to control score (mean= 5.79)] .^{15, level II-3}

Lioutas ED and Tzimitra-Kalogianni I conducted a cross sectional study in Greece to examine the ways in which food advertising propels children's consumer behaviour and to investigate how food advertising affects the frequency of unhealthy food consumption. The data were collected from a random sample of elementary school children (n=211) children age six to 12 years. They were asked to indicate the degree to which they believe that the advertised product has six different characteristics (healthy, tasty, fashionable, cheap, nutritious, and of good quality) with a scale of one (not at all) to four (very much). After completing the other questions (about 45 minutes later), children were asked to evaluate the same characteristics of a hypothetical (non-advertised) product of the same category, by using the same scale. Regression models were analysed in order to examine the relative influence of children's responses to advertising on the frequency of consumption of unhealthy food. They found that, frequency of unhealthy eating in the unhealthy eaters cluster increased for children influenced by the entertaining dimension of advertising (standardised coefficient =0.20; $p = 0.047$) but not by parents' education (standardized coefficient=-0.25; $p = 0.017$). Whereas, obese children indicate higher motivational arousal to consume unhealthy food (standardised coefficient =0.45, $p=0.025$) after the exposure to advertisements.^{16, level II-3}

5.3. PERCEPTION

Lioutas ED and Tzimitra-Kalogianni I in their cross sectional study found that, children (n= 100) favouring unhealthy eating perceive advertised food products as healthier [MD 0.49 (mean 3.22 vs 2.73), $p < 0.01$], tastier [MD 0.44 (mean 3.42 vs 2.98) $p < 0.01$], more fashionable [MD 0.39 (mean 3.69 vs 3.30), $p < 0.01$] and more nutritious [MD 0.41 (mean 3.04 vs 2.63) $p < 0.01$] compared to non-advertised food. Whereas, children (n=111) who eat healthily perceive advertised food as tastier [MD 0.31 (mean 3.24 vs 2.93) $p < 0.01$] and more fashionable [MD 0.44 (mean 3.64 vs 3.20) $p < 0.01$] compared to non-advertised food.^{16, level II-3}

5.4. RECOGNITION

Ueda P et al. conducted a cross-sectional study in Sweden to assess exposure to marketing of unhealthy food products and its relation to food related behaviour and body mass index (BMI) in children aged three to 13

years old, from different socioeconomic backgrounds in a south Indian town. A total of 306 child-parent pairs were recruited at paediatric clinics. Exposure to food marketing was assessed by a digital logo recognition test. Children matched 18 logos of unhealthy food (high in fat/sugar/salt) featured in promotion material from the food industry to pictures of corresponding products. Children's nutritional knowledge, food preferences, purchase requests, eating behaviour and socioeconomic characteristics were assessed by a digital game and parental questionnaires. Anthropometric measurements were also recorded. They reported that the average for brand logo recognition score among children was 9.8 [standard deviation (SD) = 4.3]. However, children in the high socioeconomic status (SES) group scored significantly higher on the brand logo test [mean brand logo score was 10.7 (SD=4.2)] compared to children from the low SES group [mean brand logo score was 8.5 (SD=4.0)] ($p<0.001$).^{17, level II-3}

Ng SH et al. conducted a cross sectional study in Malaysia to investigate children's attitude towards TV food advertising (TVFA) by examining four well cited induction factors namely advertisement recognition, favourite advertisement, purchase request and product preference. Total of 402 Malaysian urban school children (seven to 12 years) of equal ethnic distribution were voluntarily recruited. Questionnaire administration was facilitated using food album of 24 advertised food product consisted of core food and non-core food. Core food was defined as low-calorie, nutrient dense food product while non-core food was defined as food high in fat, refined sugar and salt (HFSS). They reported that, the participants significantly recognised more advertisement of non-core food compared to core food ($p<0.001$) as evidenced by a median score of 0.93 (95% CI: 0.80, 1.00) for non-core food compared to 0.78 (95% CI: 0.56, 0.89) for core food. In multivariate analysis, when corrected for other variables, TV viewing time was not significant with advertisement recognition [Incidence rate ratio (IRR) final adj: 1.02 (95%CI: 1.00, 1.04)].^{18, level II-3}

A cross sectional study was conducted by Boyland EJ et al. in UK to determine if levels of TV viewing (a proxy measure for habitual commercial exposure) affect children's food preference responses to TV food commercials. A total of 281 children (aged six to 13 years) viewed toy or food TV commercials followed by cartoon on two separate occasions (with two weeks interval). They were then completed three food preference measures [Leeds Food Preference Measure (LFPM) for non-branded food; Adapted Food Preference Measure (AFPM) for branded food and Leeds Forced Choice Test (LFCT)], a commercial recognition task and a TV viewing questionnaire. The authors found that children correctly recognized more food than toy commercials [mean 7.8 (1.5 SD) vs mean 7.5 (1.8 SD); (95% CI: 0.060, 0.569); $p=0.016$].^{19, level II-3}

5.5. PURCHASE REQUEST

Arnas YA in a cross sectional study reported that majority of the children (40.3%) wanted their parents to buy the products they saw on the advertisements, followed by 13.5% pointed to the products they saw on advertisements and made some comments about it, 8.9% insisted on buying the products and cried while 2.6% of the children did not show any reaction towards buying the products when they saw advertised products when they went to supermarket.^{14, level II-3}

Ueda P et al. in their cross-sectional study reported that according to the parental questionnaires, purchase request behaviour towards unhealthy food was common in the study population. They reported that the average score for purchase request was 2.6 (SD = 0.68). However, children from high SES group had a more frequent reported purchase request behaviour [mean was 2.7 (SD=0.61)] compared to the low SES group [mean was 2.4 (SD=0.71)] ($p=0.003$).^{17, level II-3}

Ng SH et al. in their cross sectional study reported that, the median score of purchase request for non-core food was 0.60, (95% CI: 0.40, 0.80) and significantly greater ($p<0.001$) than core food [median was 0.33, (95% CI: 0.1, 0.44)]. In multivariate analysis, when corrected for other variables, TV viewing time was significant with purchase request [IRR_{final} adj was 1.06, (95%CI: 1.04, 1.08), $p<0.001$]^{18, level II-3}

5.6. PREFERENCE

Sadeghirad B et al. in their systematic review found that there was small non-significant increase effect favouring preference for unhealthy food or beverages when accompanied by advertising [SMD=0.23, (95%CI: -0.04, 0.5), $p=0.094$, $I^2=87.6\%$]. The preference for unhealthy food/beverages showed a small to moderate effect size [SMD=0.46 (95%CI: 0.21, 0.72) $p=0.001$, $I^2=72.7\%$] among children ≤ 8 years but had small non-significant effect size [SMD= -0.28, (95%CI:-0.72, 0.16), $p=0.212$ $I^2=19.5\%$] among children >8 years. There was also reported that children who were exposed to the unhealthy food or beverages marketing had a higher risk of selecting the advertised products [relative risk (RR) =1.1, (95%CI: 1.0, 1.2) $p=0.052$, $I^2=27.6\%$].^{8, level I}

Arnas YA in a cross sectional study reported that majority (59.1%) of the children requested candies, 50.7% requested non-acidic soft drinks (fruit juice), 33.7% requested acidic soft drinks (such as cola), 26.8% requested milk and related products and 5.5% requested fish and meat products.^{14, level II-3}

Ueda P et al. in their cross-sectional study reported that the average score for preference towards the unhealthy options was 4.5 (SD = 2.1). However, preferences did not differ between the children in high SES

group [mean score was 4.5 (SD=2.2)] and low SES group [mean score was 4.5 (SD=1.9)] ($p=0.92$).^{17, level II-3}

Ng SH et al. in their cross sectional study reported that, the median score of product preference for non-core food was 0.73 (95% CI: 0.60, 0.87) and significantly greater ($p<0.001$) than core food [median was 0.44, (95% CI: 0.22, 0.56)]. In multivariate analysis, when corrected for other variables, TV viewing time was significant with product preference [IRR_{final adj} was 1.04, (95%CI: 1.02, 1.07), $p<0.001$]^{18, level II-3}

A cross sectional study conducted by Boyland EJ et al. found that, after viewing the food commercials, all children selected more branded fat rich [mean 4.9 (2.2 SD) vs mean 4.5 (2.2 SD); (95% CI: 0.180, 0.574) ; $p<0.001$] and carbohydrate rich [mean 4.2 (2.1 SD) vs mean 3.9 (2.3 SD); (95%CI:0.149, 0.563); $p=0.001$] items after food commercials compared with after toy commercials. They also selected more non-branded fat rich [mean 4.7 (1.9 SD) vs mean 4.2 (2.0 SD); (95% CI: 0.224, 0.637); $p<0.001$] and carbohydrate rich [mean 4.3 (2.0 SD) vs mean 3.9 (2.2 SD); (95% CI: 0.169, 0.621); $p=0.001$] items after food commercials compared with after toy commercials. Children with higher TV viewing time selected significantly more branded items [mean 19.4 (7.4 SD) vs mean 15.4 (6.8 SD); (95% CI: 2.375, 5.706); $p<0.001$] and non-branded items [mean 18.3 (6.4 SD) vs mean 15.8 (6.2 SD); (95% CI: 1.062, 4.018); $p=0.001$] compared to low TV viewers overall. However, they selected significantly more branded than non-branded items [mean 19.4 (7.4 SD) vs mean 18.3 (6.4 SD); (95% CI: 0.414, 1.854); $p=0.002$].^{19, level II-3}

Totu A et al. conducted a pre- and post-intervention study in Malaysia to examine the relationship between TV advertising and patterns of food choice among children. A total of 50 participants (children from seven to 12 years old) were involved. They were divided into two categories [middle childhood (seven to 10 years old) and early adolescence (11 to 12 years old)]. Both groups were shown a mixture of two different cartoon video clips with a stream advertising inserted in between the clips. Participants were asked to choose food and drink of their choice from a list of pictures of food and non-food related advertisements after the treatment. The authors reported that, children who were exposed to food related advertisement were more likely to choose fast food ($r=0.418$) than those who were not [$(r=0.309)$, $p<0.001$]. Meanwhile, older children (11 to 12 years old) [mean: 13.07 (2.45 SD)] appear less inclined to select fast food as compared to those younger (seven to 10 years old) [mean: 14.25 (2.81 SD), $p<0.05$] after exposure to food advertisement. Whereas, female [mean: 13.91, (2.39 SD)] appear less inclined to select fast food as compared to male [mean: 14.44 (3.88 SD), $p<0.05$] after exposure to food advertisement.^{20, level II-3}

5.7. HEALTH PROBLEM

Body mass index (BMI)

Bacardi-Gascon M and Jimenez-Cruz A in their systematic review found that there was positive association of the hours of TV viewing and the children Z-BMI score ($r = 0.14$, $p = 0.001$) was reported in only one study.^{11, level II-3}

Ueda P et al. in their cross sectional study reported the average score for BMI among children was 15.4 (SD = 3.1). Children in the lowest SES group had a lower BMI [mean; 14.4 (SD=1.9)] compared to those in high SES group [mean; 16.1 (SD=3.8)] ($p < 0.001$). Meanwhile, in a linear regression after adjusted for gender, age and socioeconomic group, logo recognition was associated with higher BMI [association was 0.128 (95% CI: 0.018, 0.238), $p = 0.022$] among the participants.^{17, level II-3}

Boyland EJ et al. in their cross sectional study found that, BMI SD score was significantly higher in the high TV viewing group than in low TV viewing group [mean 0.76 (1.3 SD) vs mean 0.37 (1.1 SD); (95% CI: 0.102, 0.677); $p = 0.008$].^{19, level II-3}

CARIES

A cross sectional study was conducted by Ghimire N and Rao A In India to evaluate the influence of TV advertisements on children, the relationship with oral health and to analyse the content of those advertisements. The questionnaire-based study was performed among 600 (aged 10-13 years old) schoolchildren of Mangalore, Karnataka, followed by oral examination. Dental caries of all the participating children were recorded using DMFT (for permanent teeth) and dmft (for deciduous teeth) index. The DMFT index was used for the purpose of assessing the severity of dental caries in permanent dentition (D=decayed teeth, M=missing teeth due to caries, F=teeth that have been previously filled with permanent restoration). Meanwhile the dmft index was used for the purpose of assessing the severity of dental caries in deciduous dentition before the age of exfoliation (d=decayed teeth, m=missing teeth due to caries, f=filled teeth). Each component (d, m, f) was added separately and the total dmft was obtained. Based on the survey, favourite and non-favourite channels and viewing times were analysed. Advertisements on children's favourite and non-favourite channels were then viewed, analysed, and compared. They found that cariogenic food advertisements were popular on children's favourite channels (87.65% of total food advertisement). They also reported that higher caries prevalence was found among children who watched television and requested for advertised food and soft drinks. Among 600 participants, there were 445 children who watched advertisement between programs while 155 children were not. There were more children [$n=213$ (47.87%)] had DMFT permanent among those children who watched advertisement between programs compared to

those who did not watch advertisement between programs [n=38 (24.52%); $p<0.001$]. There were also more children [n=193 (43.37%)] had dmft deciduous among those children who watched advertisement between programs compared to those who did not watch advertisement between programs [n=38 (24.52%); $p<0.012$].^{21, level II-3}

Meanwhile, there were 396 children who requested to purchase the advertised food and 204 were not. Among them, there were 194 (48.99%) had DMFT permanent compared to those who did not [n=57 (27.94%); $p<0.001$]. There were also more children [n=178 (44.94%)] had dmft deciduous among children who requested to purchase the advertised food compared to those who did not [n=53 (25.98%); $p<0.001$]. Whereas, there were 291 children who requested to purchase the advertised soft drinks there were 309 were not. Among them 146 (50.17%) had DMFT permanent compared to those who did not [n=105 (33.98%); $p<0.003$]. There were also 138 (47.42%) dmft deciduous among children who requested to purchase the advertised soft drinks compared to those who did not [n= 93 (30.09%); $p<0.001$]. The authors concluded that TV advertisements may strongly influence children's food preferences and eating habits, resulting in higher caries prevalence.^{21, level II-3}

5.8. KNOWLEDGE

Ueda P et al. found that average nutritional knowledge score when specifying which foods were "healthy" or "unhealthy" was 7.4 (SD=2.1) among the participants. However, children from the high SES group received higher score on the nutritional knowledge test [mean; 8.1 (SD=1.8)] compared to the low SES group [mean; 6.1 (SD=2.1)] ($p<0.001$). In a Poisson regression adjusted to gender, age and socioeconomic group, they found that there was positive relationship between brand logo recognition and nutritional knowledge [association was 0.034 (95% CI: 0.020, 0.047)] $p<0.001$.^{17, level II-3}

A cross sectional study was conducted by Tatlow-Golden M et al. in Ireland to identify the development and determinants of children's early food brand knowledge for brands that highly advertised on TV. The study was part of a larger project examining aspects of pre-schooler's food, drink and advertising related knowledge and practices. A total of 172 children (aged three to five years) were participated in the study. Information about family demographics, eating habits and children's TV viewing were given by parent through questionnaire. Children were interviewed individually by one of five experienced researchers consist of naming the brand and product type. Then, they were asked to match the board of food and drink images with brand logo images. The author reported that, children had significantly higher brand knowledge of unhealthy food compared to healthy food for brand names [unhealthy (mean:2.21, SD:1.38) vs healthy (mean:0.62, SD: 0.88); $p <0.001$],

product types [unhealthy (mean:3.40, SD:1.59) vs healthy (mean:1.39, SD:1.18); $p<0.001$], and visual recognition [unhealthy (mean:3.82, SD:1.45) vs healthy (mean:1.85, SD:1.36); $p<0.001$].^{22, level II-3}

Children's unhealthy brand knowledge was significantly positively related to their TV viewing [brand name ($r=0.255$, $p=0.006$), product type ($r=0.368$, $p<0.001$) and image matching ($r=0.298$, $p=0.001$)]. However, it was significantly negatively related to their healthy eating [brand name ($r=-0.499$, $p<0.001$), product type ($r=-0.452$, $p<0.001$) and image matching ($r=-0.289$, $p=0.002$)], parents' healthy eating [brand name ($r=-0.543$, $p<0.001$), product type ($r=-0.481$, $p<0.001$) and image matching ($r=-0.233$, $p=0.011$)] and mothers' education [brand name ($r=-0.309$, $p=0.001$), product type ($r=-0.389$, $p<0.001$) and image matching ($r=-0.225$, $p=0.013$)].^{22, level II-3}

5.9. LIMITATIONS

This technology review has several limitations. The selection of studies done by one reviewer. Although there was no restriction in language during the search but only English full text articles were included in this review.

6. CONCLUSION

There was fair to good level of retrievable evidence to suggest that unhealthy food and beverages marketing increased dietary intake and food consumption. Evidence suggest that the effect was more significant in children and with increased frequency of TV viewing.

There was fair to good level of retrievable evidence to suggest that unhealthy food and beverages marketing increased children preference towards advertised food. The effect was more significant among younger age group of children and with increased frequency of TV viewing.

There was limited fair level of retrievable evidence to suggest that exposure to unhealthy food and beverages marketing increased desire and frequency to consume food products, increased perception, increased recognition, increased purchase request and increased brand knowledge among children.

There was also limited fair level of retrievable evidence to suggest that frequency of TV viewing (unhealthy food and beverages advertisement) and logo recognition was associated with BMI and dental caries.

7. REFERENCES

1. A framework for implementing the set of recommendations on the marketing of food and non-alcoholic beverages to children. Geneva: World Health Organization; 2012. Available at <http://www.who.int/dietphysicalactivity/MarketingFramework2012.pdf>. Accessed on 28 February 2017
2. Marketing Food to Children: the Global Regulatory Environment. Available at whqlibdoc.who.int/publications/2004/9241591579.pdf. Accessed on 27 February 2017
3. Unhealthy food marketing. Available at <https://www.heart.org/idc/groups/heartpublic/@wcm/@adv/documents/downloadable/ucm474473.pdf>. Accessed on 27 February 2017)
4. WHO Nutrient Profile Model for South-East Asia Region. Available at <http://www.searo.who.int/entity/nutrition/en/>. Accessed on 15 June 2017
5. Ng SH, Kelly B, Se CH et al. Obesogenic television food advertising to children in Malaysia: sociocultural variations. Glob Health Action. 2014; 7: 1-11
6. Karupaiah T, Chinna K, Mee LH. What's on Malaysian television? - A survey on food advertising targeting children. Asia Pac J Clin Nutr. 2008;17 (3):483-491
7. Kelly B, King L, Rayner M et al. Monitoring food and non-alcoholic beverage promotions to children. Obes Rev. 2013;14 (1):59-69
8. Sadeghirad B, Duhaney T, Motaghiphisheh S et al. Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systemic review and meta-analysis of randomized trials. Obes Rev. 2016 ; 17: 945-959
9. Boyland EJ, Nolan S, Kelly B et al. Advertising as cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and non-alcoholic beverage advertising on intake in children and adults. Am J Clin Nutr. 2016; 103 (2): 519-533
10. Gregori D, Ballali S, Gabriella M et al. Randomized Controlled Trials Evaluating Effect of Television Advertising on Food Intake in Children: Why Such a Sensitive Topic is Lacking Top-Level Evidence? Eco Food Nutri. 2014; 53: 562-577

11. Bacardi-Gascon M and Jimenez-Cruz A. TV food advertising geared to children in Latin-American countries and Hispanics in the USA: a review. *Nutr Hosp.* 2015; 31: 1928-1935
12. Kelly B, Freeman B, King L et al. Television advertising, not viewing, is associated with negative dietary patterns in children. *Paed obesity.* 2015; 11: 158-160
13. Utter J, Scragg R, Schaaf D et al. Association between television viewing and consumption of commonly advertised foods among New Zealand children and young adolescents. *Pub Health Nutri.* 2005; 9 (5): 606-612
14. Arnas YA. The effect of television food advertisement on children's food purchasing request. *Paed Int.* 2006; 48: 138-145
15. Pettigrew S, Tarabashkina L, Roberts M et al. The effects of television and internet food advertising on parents and children. *Pub Health Nutri.* 2013; 16(12): 2205-2212
16. Lioutas ED and Kalogianni IT. 'I saw Santa Drinking soda!' Advertising and children's food preference. *Child Care, health Dev.* 2014; 41(3): 424-433
17. Ueda P, Tong L, Viedma C et al. Food marketing towards children: Brand Logo Recognition, Food-related Behaviour and BMI among 3 – 13 years old in a South Indian Town. *Plos One.* 2012; 7 (10): 1-7
18. Ng SH, Kelly B, Se CH et al. Reading the mind of children in Response to food advertising: a cross-sectional study of Malaysian school children's attitudes towards food and beverages advertising on television. *BMC Public Health.* 2015; 15: 1-14
19. Boyland EJ, Harrold JA, Kirkham TC et al. Food commercials increase preference for Energy Dense Foods, particularly in Children who watch more television. *Paediatrics.* 2011; 128: 93-100
20. Totu A, Igau OA, Halik M. TV commercials and choice of food among children in Sabah, Malaysia. *IOSR-JHSS.* 2013; 15(6): 81-89
21. Ghimire N and Rao A. Comparative evaluation of the influence of television advertisements on children and caries prevalence. *Glob Health Action.* 2013; 6: 1-8
22. Tatlow-Golden M, Hennessey E, Dean M et al. Young children's food brand knowledge. Early development and associations with television viewing and parent's diet. *Apetite.* 2014; 80: 197-203

8. APPENDIX

8.1. Appendix 1: LITERATURE SEARCH STRATEGY

Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE®Daily and Ovid MEDLINE®1946 to Present

- 1 CHILD/ (1508997)
- 2 child*.tw. (1169571)
- 3 CHILD, PRESCHOOL/ (820303)
- 4 preschool child*.tw. (11177)
- 5 1 or 2 or 3 or 4 (2096686)
- 6 MARKETING/ (4376)
- 7 ((audience or market) adj research).tw. (603)
- 8 marketing.tw. (20740)
- 9 (research, adj (audience or market)).tw. (22)
- 10 ADVERTISING AS TOPIC/ (13715)
- 11 advertis* as topic*.tw. (3)
- 12 telemarketing.tw. (47)
- 13 Health promotion/ (62775)
- 14 (Promotional adj1 item*).tw. (83)
- 15 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 (96792)
- 16 FOOD/ (29202)
- 17 Unhealthy food.tw. (556)
- 18 Unhealthy diet.tw. (544)
- 19 High fat food*.tw. (610)
- 20 Saturated trans fat food*.tw. (0)
- 21 High sugar food*.tw. (101)
- 22 High salt food*.tw. (37)
- 23 BEVERAGES/ (12929)
- 24 beverage*.tw. (19554)
- 25 Unhealthy beverages.tw. (6)
- 26 CARBONATED BEVERAGES/ (2351)
- 27 (carbonated adj (drink* or beverage*)).tw. (590)
- 28 soda pop*.tw. (63)
- 29 soft drink*.tw. (2959)
- 30 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (60319)
- 31 15 and 30 (2013)
- 32 5 and 31 (889)
- 33 limit 32 to (english language and humans) (800)

OTHER DATABASES	
EBM Reviews - Cochrane Central Register of Controlled Trials	
EBM Reviews - Cochrane database of systematic reviews	
EBM Reviews - Health Technology Assessment	Same MeSH, keywords, limits used as per MEDLINE search
EBM Reviews - NHS Economic Evaluation Database	
EBM Reviews - Database of Abstract of Review of Effects	

PubMed

Search ((((((CHILD[Title/Abstract]) OR child*[Title/Abstract]) OR CHILD, PRESCHOOL[Title/Abstract]) OR preschool child*[Title/Abstract])) AND (((((((((((MARKETING[Title/Abstract]) OR ((audience[Title/Abstract] OR market) adj research[Title/Abstract])) OR marketing[Title/Abstract]) OR (research, adj (audience[Title/Abstract] OR market)[Title/Abstract])) OR ADVERTISING AS TOPIC[Title/Abstract]) OR advertis* as topic*[Title/Abstract]) OR telemarketing[Title/Abstract]) OR Health promotion[Title/Abstract]) OR Promotional adj1 item*[Title/Abstract])) AND (((((((((((FOOD[Title/Abstract]) OR Unhealthy food[Title/Abstract]) OR Unhealthy diet[Title/Abstract]) OR High fat food*[Title/Abstract]) OR Saturated trans fat food*[Title/Abstract]) OR High sugar food*[Title/Abstract]) OR High salt food*[Title/Abstract]) OR BEVERAGES[Title/Abstract]) OR beverage*[Title/Abstract]) OR Unhealthy beverages[Title/Abstract]) OR CARBONATED BEVERAGES[Title/Abstract]) OR (carbonated adj (drink*[Title/Abstract] OR beverage*[Title/Abstract])) OR soda pop*[Title/Abstract]) OR soft drink*[Title/Abstract]))

8.2. Appendix 2

DESIGNATION OF LEVELS OF EVIDENCE

- I Evidence obtained from at least one properly designed randomized controlled trial.
- II-1 Evidence obtained from well-designed controlled trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group.
- II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- III Opinions or respected authorities, based on clinical experience; descriptive studies and case reports; or reports of expert committees.

SOURCE: US/CANADIAN PREVENTIVE SERVICES TASK FORCE (Harris 2001)

Evidence Table : Effect of of unhealthy food marketing
 Question : What is the effect of unhealthy food marketing?

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
1.Sadeghirad B, Duhaney T, Motaghiphishe h S et al. Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systemic review and meta-analysis of randomized trials. Obes Rev. 2016 ; 17: 945-959 Canada	<p>Study design Systematic review</p> <p>Objective To assess the effects of unhealthy food and beverage marketing on dietary intake and dietary preference among children 2 to 18 years of age</p> <p>Methods They searched MEDLINE, EMBASE and PsycINFO up to January 2015 for terms related to advertising, unhealthy food or beverages among children</p> <p>Randomized trials that assessed the effects of unhealthy food and beverage marketing compared with non-dietary advertisement or no advertisement in children were considered eligible</p> <p>Two authors independently extracted information on study characteristics and outcomes of interest and assessed risk of bias and the overall quality of evidence using GRADE methodology</p> <p>Meta-analysis was conducted separately for dietary intake and preference using a random-effects model.</p> <p>Three measures of effect were used: mean difference, standardized mean difference (SMD) and relative risk (RR)</p> <p>Heterogeneity was also determined</p>	I	<p>29 eligible studies were included (n=5,814)</p> <p>17 studies were included for meta-analysis of dietary preference</p> <p>Nine for meta-analysis of dietary intake</p> <p>3 studies were excluded from meta-analysis</p> <p>Mean age=8.2 years [interquartile range (IQR): 5.6, 9.5]</p> <p>Median sample size = 105 participants (IQR: 65, 261)</p>	Unhealthy food and beverage marketing	Non-dietary advertisement or no advertisement		<p>1)Effects on dietary intake</p> <p>Dietary intake (kilocalories)</p> <ul style="list-style-type: none"> Among the six included studies, the pooled estimate showed a significant increase of 30.4kcal [(95%CI: 2.9, 57.9) p=0.003] favouring exposure to unhealthy dietary advertising vs. non-dietary advertising (I²=72.0%) <p>Dietary intake (grammes)</p> <ul style="list-style-type: none"> A significant increase of 4.8g [(95%CI: 0.8, 8.8) p=0.018] among those exposed to unhealthy dietary advertising (I²=31.6%) <p>2)Effects on dietary preference</p> <p>Dietary preference scores</p> <ul style="list-style-type: none"> Meta-analysis showed a small non-significant increased effect favouring preference for unhealthy food/beverages when accompanied by advertising [SMD=0.23, (95%CI: -0.04, 0.5), p=0.094 I²=87.6%] The mean age of participants in the eight RCTs (879 children) was ≤8years, and their preference for unhealthy food/beverages showed a small to moderate effect size [SMD=0.46 (95%CI: 0.21, 0.72) p= 0.001, I²=72.7%] Four RCTs (n=1,174) including participants >8years, their dietary preference for unhealthy food/beverages showed a small non-significant effect size [SMD= -0.28, (95%CI:-0.72, 0.16), p=0.212 I²=19.5%] 	

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
							Food preference percentage <ul style="list-style-type: none"> Children exposed to unhealthy food/beverages marketing had a higher risk of selecting the advertised products that were associated with a familiar licenced-character/logo [RR=1.1, (95%CI: 1.0, 1.2) P=0.052, I²=27.6%] 	

Evidence Table : Effect of of unhealthy food marketing
 Question : What is the effect of unhealthy food marketing?

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
2.Boyland EJ, Nolan S, Kelly B et al. Advertising as cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and non-alcoholic beverage advertising on intake in children and adults. Am J Clin Nutr. 2016; E pub ahead 2016. United Kingdom	<p>Study design Systematic review and meta-analysis</p> <p>Objective To examine the evidence for a relation between acute exposure to experimental unhealthy food advertising and food consumption</p> <p>Methods Five electronic databases were searched for relevant publications (SCOPUS, PsycINFO, MEDLINE, Emerald Insight, and JSTOR) for studies with experimental designs and both within-subjects/ repeated-measures and between-subjects/independent-groups designs</p> <p>Inclusion criteria: Manipulated acute advertising exposure (including at least one condition in which participants were exposed to unhealthy food or non-alcoholic beverage advertising on television or the Internet and another condition with a non-food advertisement or a no-advertisement control) and formally measured food or non-alcoholic beverage intake, which was assessed as either energy intake or the quantity of item consumed.</p> <p>Participants of any age or weight status</p> <p>Exclusion criteria: Studies of product placement exposure (because this content is not controlled entirely by the food or beverage</p>	I	<p>22 eligible publications were included</p> <p>18 articles (7 adults,11 children) were included in meta- analysis</p>	Unhealthy food or non-alcoholic beverage advertising on television or the Internet	A non-food advertisement or a no-advertisement		<p>Food intake</p> <p>With all 20 possible comparisons included, a SMD of 0.37 [(95% CI: 0.09, 0.65) P = 0.01; I² = 98%] was observed, which constituted a small-to-moderate effect size that showed that participants ate more after food advertising than after the control conditions.</p> <p>The removal of the one study that examined beverage consumption did not change the results.</p> <p>Advertising exposure had a significant effect on food intake with participants consuming a greater amount of food after food advertisements than after the control condition [SMD=0.56, (95% CI: 0.18, 0.94) P = 0.003, I² = 98%] on children.</p>	

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
	<p>manufacturer)</p> <p>Two authors (EJB and BK) were responsible for the evaluation of articles</p> <p>A single author (EJB) extracted data from the included studies, and these data were checked independently by a different author (AJ).</p> <p>Quality assessment was carried out</p> <p>Data was analysed result was presented in standardized mean different (SMD)</p>							

Evidence Table : Effect of of unhealthy food marketing
 Question : What is the effect of unhealthy food marketing?

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
3.Gregori D, Ballali S, Gabriella M et al. Randomized Controlled Trials Evaluating Effect of Television Advertising on Food Intake in Children: Why Such a Sensitive Topic is Lacking Top-Level Evidence?Eco Food Nutri. 2014; 53: 562-577 Italy	<p>Study design Systematic review</p> <p>Objective To review evidence on experimental research focused on the relationship between exposure to TV advertising and actual food intake</p> <p>Methods Systematically searched for RCTs that assessed the effect of direct exposure to television food advertising compared to non-food commercial over the actual energy intake of children.</p> <p>No restrictions on time or language were applied.</p> <p>All included abstracts were independently identified by two reviewers, and paper selection was independently performed, in order to select the articles fulfilling the inclusion criteria.</p> <p>All studies whose outcome was food intake's quantification during or immediately after screen time, were chosen.</p> <p>A summary of the selection criteria and search strategy is provided.</p> <p>For each paper included in the</p>	II-I	<p>7 studies included out of 2166 studies</p> <p>children from 4 to 12 years old</p>	Television food advertising	Non-food commercial		<p>Food intake</p> <p>(Halford et al. 2007; Halford et al. 2008) showed that total kcal intake was significantly higher after exposure to food advertising. Also, Harris et al. (2009) and Dovey et al. (2011) observed a relevant higher consumption of snacks during food advertising.</p> <p>Anschutz et al. (2009) reported on the potential existence of a gender effect, demonstrating that snack intake was different among girls and boys. Indeed, food intake in boys was higher when watching food advertising, whereas snack intake in girls was slightly lower when exposed to food advertising.</p> <p>Halford et al. (2004) found that major consumption of snacks among obese and overweight children, both in the food advertising group and in non-food one.</p> <p>Author's conclusion Considering the insufficient data incident to this topic and the poor methodological quality of the few available evidences, more RCTs addressing the relationship between TV advertising and food intake in children, perhaps using strong outcomes like energy intake instead of food preferences, are required to deepen knowledge on causal relationships and therefore to set the root for incisive prevention.</p>	

Bibliographic citation	Study Type/Methods	LE	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
	<p>review, authors, study design, population (dimension and age group), aim of the study, setting and intervention, outcome of interest, and results, were recorded.</p> <p>The methodological quality of the studies was assessed using the Jadad scale for RCTs (Jadad et al. 1996).</p>							

Evidence Table : Effect of of unhealthy food marketing
 Question : What is the effect of unhealthy food marketing?

Bibliographic citation	Study Type/Methods	L E	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
4. Bacardi-Gascon M and Jimenez-Cruz A. TV food advertising geared to children in Latin-American countries and the USA: a review. Nutr Hosp. 2015; 31: 1928-1935 Mexico	<p>Study design Systematic review</p> <p>Objective To analyze the studies exploring food advertising in TV conducted in Latin-American countries and in the USA geared to Hispanics.</p> <p>Methods An electronic literature search was conducted in the MEDLINE/PubMed, EMBASE, SCIELO, and CINAHL, databases and open access internet, of food advertising directed to children in TV in Latin American countries and Hispanics living in the USA, published from 1985 to January, 2015</p> <p>Article selection, assessment risk of bias was not mentioned</p>	II-2	Twenty three studies	TV food advertising			<p>Ten of the studies have focused exclusively on unhealthy food, 12 on unhealthy and healthy, and two have not explored any type of food.</p> <p>Only two studies reported on food consumption</p> <p>Bacardi-Gascon M et al. (2013) reported that there was an association between the frequency of food advertised and the food consumption of those foods by the mother ($r = 0.79$, $p = 0.0001$) and their children ($r = 0.79$, $p = 0.0001$).</p> <p>Meanwhile, Diaz-Ramirez M et al. (2013) also reported that there was an association between the frequency of food advertised and the food consumption of those food by the mother ($r = 0.73$, $p = 0.0001$) and their children ($r = 0.66$, $p = 0.0001$).</p>	

Evidence Table : Effect of of unhealthy food marketing
 Question : What is the effect of unhealthy food marketing on food intake?

Bibliographic citation	Study Type/Methods	L E	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
5.Kelly B, Freeman B, King L et al. Television advertising, not viewing, is associated with negative dietary patterns in children. Ped obesity.2015 ;11:158-160 Australia	<p>Study design Cross-sectional study</p> <p>Objective To quantify the specific impact of television advertising, as distinct from television viewing generally on children's usual diet</p> <p>Methods An online survey was conducted with Australian children (10-16 years old) during October – November 2014</p> <p>Parents were contacted via email to invite their child to participate</p> <p>Survey measures:</p> <ol style="list-style-type: none"> 1. Socio demographic characteristic 2. Commercial/noncommercial television viewing habits (min/day, weekday, weekends) 3. Consumption of frequently advertised unhealthy food/drinks <p>Frequency of intake was dichotomized: 'less than weekly' or 'at least weekly'.</p> <p>Analysis of variance Scheffe post-hoc testing was used to compare TV viewing quartiles and food/ drink scores</p>	II-3	417 children 53% female Mean age: 13 years (SD=1.9)	Commercial/non commercial television viewing habit			<p>Food consumption</p> <p>Regression analysis after adjusted for age and socioeconomic status, there was unit increased in the parameters with increasing each hour of commercial television viewing per week.</p> <ul style="list-style-type: none"> • unhealthy food score 0.048 (standard error (SE) =0.01), p<0.001 • unhealthy drink score 0.019 (SE=0.007), p<0.01) • unhealthy food/drink combined score 0.067 (SE= 0.015), p<0.001 <p>Author's conclusion: The link between television viewing and poor diet was strongest for children who watched the most commercial television and those who were actually exposed to advertisement embedded within programmes</p>	

Bibliographic citation	Study Type/Methods	L E	Number of Patients & Patient Characteristic	Intervention	Comparison	Length of Follow Up (If Applicable)	Outcome Measures/Effect Size	General Comments
	Multiple regression used to determined associations between commercial television viewing and food/drinks scores, controlling for SES and age.							

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6.Utter J, Scragg R, Schaaf D et al. Association between television viewing and consumption of commonly advertised food among New Zealand children and young adolescents. Pub Health Nutri. 2005; 9 (5):606-612. New Zealand	<p>Study design Secondary data analysis of a nationally representative, cross-sectional survey.</p> <p>Objective To explore how time spent watching television (TV) is associated with the dietary behaviours of New Zealand children and young adolescents</p> <p>Methods The current paper reports data collected in the 2002 National Children's Nutrition Survey (CNS02) that was a cross-sectional population survey that assessed multiple indicators of child nutrition through interviews, dietary assessments, anthropometric measurements and clinical measures.</p> <p>CNS02 used a two-stage cluster sample design to produce a representative sample of New Zealand school children, aged 5 to 14 years</p> <p>In general, the most commonly advertised food in New Zealand were snack food and sweet snacks, drinks and fast food, and the least commonly advertised food were fruits, vegetables and milk. Those findings from previous study guided the selection of food items for</p>	II-3	<p>n=3275 children aged 5 to 14 years.</p> <p>Classified as children (ages 5 to 10 years) and adolescents (ages 11 to 14 years)</p>	Commonly advertised food			<p>Food intake in Children (5-10 years) Children who watched two or more hours of TV per day were less likely to consume:</p> <ul style="list-style-type: none"> Fruits [OR 0.5 (95% CI: 0.3, 0.7) p=0.003] Vegetables [OR 0.6 (95% CI: 0.4, 0.9) p=0.07] Milk [OR 0.9 (95% CI: 0.6, 1.4) p=0.9] <p>Children who watched two or more hours of TV per day were more likely to consume advertised food:</p> <ul style="list-style-type: none"> Soft drinks [OR 2.2 (95% CI: 1.2, 4.0) p=0.029] Fruit drinks [OR 1.7 (95% CI: 1.1, 2.6) p=0.002] Potato crisps [OR 1.8 (95% CI: 1.3, 2.6) p=0.003] Chocolate sweets [OR 1.5 (95% CI: 1.0, 2.3) p=0.17] Biscuits [OR 1.5 (95% CI: 1.0, 2.2) p=0.006] Hamburgers [OR 2.0 (95% CI: 1.2, 3.2) p=0.016] French fries [OR 2.1 (95% CI: 1.4, 3.1) p<0.001] Fried chicken [OR 1.8 (95% CI: 1.1, 2.9) p=0.07] <p>Food intake in adolescents (11-14 years) Adolescents who watched two or more hours of TV per day were less likely to consume:</p> <ul style="list-style-type: none"> Fruits [OR 0.7 (95% CI: 0.5, 1.2) p=0.43] Vegetables [OR 0.6 (95% CI: 0.4, 1.6) p=0.12] Milk [OR 0.7 (95% CI: 0.4, 1.1) p=0.29] <p>Adolescent who watched two or more hours of TV per day were more likely to consume advertised food:</p> <ul style="list-style-type: none"> Soft drinks [OR 2.3 (95% CI: 1.2, 4.4) p=0.036] Fruit drinks [OR 1.8 (95% CI: 1.0, 3.4) p=0.17] Potato crisps [OR 1.8 (95% CI: 1.0, 3.2) p=0.14] Chocolate sweets [OR 2.2 (95% CI: 1.3, 3.6) p=0.004] Biscuits [OR 1.7 (95% CI: 0.9, 3.2) p=0.23] Hamburgers [OR 1.8 (95% CI: 1.2, 2.9) p=0.018] French fries [OR 2.4 (95% CI: 1.4, 4.0) p=0.003] 	

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	<p>analysis in the current study.</p> <p>The food selected included: potato crisps, chocolate sweets, biscuits, carbonated soft drinks, fruit drinks (not 100% juice), hamburgers, fried chicken and French fries, fruit (average consumption of 10 fruits), vegetables (average consumption of 17 vegetables, excluding potatoes, taro, and kumara or sweet potato) and non-flavoured milk.</p> <p>All analyses were conducted separately for two age groups, children (ages 5 to 10 years) and adolescents (ages 11 to 14 years)</p>						<ul style="list-style-type: none"> Fried chicken [OR 0.9 (95% CI: 0.6, 1.5) p=0.91] <p>Author's conclusion Longer duration of TV watching (thus, more frequent exposure to advertising) influences the frequency of consumption of soft drinks, some sweets and snacks, and some fast food among children and young adolescents.</p>	

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7.Arnas YA. The effect of television food advertisement on children's food purchasing request. Paed Int. 2006; 48:138-145 Turkey	<p>Study design Cross sectional study</p> <p>Objective To examine television advertisements and children 's food consumption while watching television and their desire to purchase goods that they see on television advertisements</p> <p>Methods Study was conducted in two parts. First part was on content analysis of the television advertisements during child programs on Saturday and Sunday morning</p> <p>Second part of the study focused on Children's behaviors while watching television advertisements and their purchasing requests during shopping, in children aged 3 – 8 years old.</p> <p>A questionnaire was given to 347 parents. A total of 104 of the parents' children were attending first, second, and third grades of the primary schools and 243 of the children were attending the pre-school</p> <p>Schools of the children were visited and the teachers were informed about the research and they were asked to deliver the questionnaire to the families.</p> <p>Families which have more than one</p>	II-3	347 parents of 3-8 year old children	Television advertisements			<p>Food intake while watching television</p> <ul style="list-style-type: none"> • 60.8% of children consumed fruits • 44.1% consumed soft drink • 36.6% corn/nuts • 33.7% cake • 33.4% chips • 28.8% chocolate/candy <p>Children behavior</p> <ul style="list-style-type: none"> • 33.4% looks for time to time • 32.85% of the children wants the product • 29.4% makes comment about advertisement • 20.2% watches advertisement a few times • 17.6% of the children pay attention to the advertisements • 6.9% of the children were not taking any notice of the advertisements <p>Purchase request when go to supermarket</p> <ul style="list-style-type: none"> • 40.3% wanted their parents to buy the products they saw on the advertisements • 13.5% pointed to the products they saw on advertisements and made some comments about it • 8.9% insisted on buying the products and cried • 2.6% of the children did not show any reaction towards buying the products when they saw advertised products <p>Preference</p> <ul style="list-style-type: none"> • 59.1% of the children requested candies • 50.7% of them requested non-acidic soft drinks (fruit juice) • 33.7% of them requested acidic soft drinks (such as cola) • 26.8% of them requested milk and 	

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	child completed the questionnaire for considering their child who is in the specified age group.						related products <ul style="list-style-type: none"> • 5.5% of them requested fish and meat products 	

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8.Pettigrew S, Tarabashkin a L, Roberts M et al. The effects of television and internet food advertising on parents and children. Pub Health Nutri.2013; 16(12):2205-2212. Australia	<p>Study design Cross sectional study</p> <p>Objective To examine the impact of television and Internet food advertising on Australian parents and children</p> <p>Methods Respondents were sourced from an online panel provider with access to a large number of Australians of varying demographic profiles</p> <p>Six versions of the questionnaire were developed – three for the parents and three for the children. The items included in the questionnaires were based on those used in Grier et al. study of parental perceptions of fast-food advertising and Jones and Fabrianesi study of children's and parents' perceptions of advertising.</p> <p>One parent and one child questionnaire featured four television food advertisements, one parent and one child questionnaire featured Internet advertisements for the same four products, and one parent and one child questionnaire showed pictures of the food products that served as the control condition.</p> <p>The four branded food products featuring in all six questionnaires were fried chicken, popcorn, a snack bar and confectionery.</p>	II-3	N= 2604 children aged 8 to 14 years and their parents.	Television food advertisements and internet advertisement	Pictures of food products		<p>Desire to consume For both parents and children, the desire to consume the products was stronger among those in the advertising exposure conditions, although the effect was significant only among the parents:</p> <ul style="list-style-type: none"> • Mean Different (MD) between television score (6.63) vs control score (6.27) was significant p< 0.01 • MD between internet score (6.59) vs control score (6.27) was significant p<0.01 <p>Perceived appropriate consumption Significant differences in perceived appropriate consumption frequency by exposure were found for parents</p> <ul style="list-style-type: none"> • Mean Different (MD) between television score (8.43) vs control score (9.31) was significant p< 0.01 • MD between internet score (9.20) vs control score (8.43) was significant p<0.01 <p>For children, perceived appropriate consumption was limited to those exposed to the Internet advertisements</p> <ul style="list-style-type: none"> • MD between internet score (6.13) vs control score (5.79) was significant p<0.01 <p>No significant differences were found in relation to desire to consume the products and appropriate consumption frequency between the Internet and television groups, indicating that advertisements in these media are equally capable of influencing adults and children</p> <p>There were significant differences in all four products evaluation among parents: 1.Fried chicken</p> <ul style="list-style-type: none"> • Mean Different (MD) between television score (10.60) vs control score (10.02) was 	

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	<p>Those products were selected to cover a broad range of advertised foods that are likely to be popular with children and that have high levels of fat, sugar and/or salt (as per UK Food Standards Agency thresholds).</p> <p>The stimuli for the television advertisements were 30s advertisements that had aired on television during the previous 12 months</p> <p>The stimuli for the Internet advertisements were webpages featuring each of the products.</p> <p>The stimuli for the control group were static pictures, identical in size, of each food product.</p> <p>Each parent-child dyad was exposed to the same media (television advertisement, Internet advertisement or picture) and to a total of four advertisements, one for each food product</p> <p>Data were analysed using the ANOVA method whereby one-way factorial ANOVA were performed to identify differences in the desire to consume the advertised products, perceived appropriate consumption frequency and product evaluations between the television and Internet exposure groups and the control group</p>						<p>significant $p < 0.01$</p> <ul style="list-style-type: none"> MD between internet score (10.62) vs control score (10.02) was significant $p < 0.01$ <p>2.Snack bar</p> <ul style="list-style-type: none"> Mean Different (MD) between television score (11.68) vs control score (10.73) was significant $p < 0.01$ MD between internet score (11.70) vs control score (10.73) was significant $p < 0.01$ <p>3.Pop corn</p> <ul style="list-style-type: none"> Mean Different (MD) between television score (12.19) vs control score (11.76) was significant $p < 0.01$ MD between internet score (12.35) vs control score (11.76) was significant $p < 0.01$ <p>4.Confectionary</p> <ul style="list-style-type: none"> Mean Different (MD) between television score (12.60) vs control score (12.10) was significant $p < 0.01$ MD between internet score (12.64) vs control score (12.10) was significant $p < 0.01$ <p>There were significant differences in only 1 product evaluation among children:</p> <p>1.Snack bar:</p> <ul style="list-style-type: none"> Mean Different (MD) between television score (6.87) vs control score (6.53) was significant $p < 0.05$ MD between internet score (6.93) vs control score (6.53) was significant $p < 0.01$ 	

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9.Lioutas ED and Kalogianni IT. 'I saw Santa Drinking soda!' Advertising and children's food preference. Child Care, health Dev. 2014; 41(3): 424-433 Greece	<p>Study design Cross-sectional study</p> <p>Objective</p> <ol style="list-style-type: none"> To determine the ways in which food advertising propels children consumer behavior To investigate how food advertising affects the frequency of unhealthy food consumptions <p>Methods Data were collected from a random sample of elementary school children in the region of Thessaly (central Greece) through stratified random sampling</p> <p>A questionnaire that included closed and open-ended questions was used as survey instrument</p> <p>14 experts were used to assess content and face validity of questionnaire</p> <p>Questionnaire administered by first author and three trained interviewers</p> <p>Descriptive and inferential statistic were used during data analysis process</p> <p>Outcome measures:</p> <ul style="list-style-type: none"> Personnel and family characteristic Influence of advertising on 	II-3	<p>211 children Age 6-12 years (mean= 8.79 years, SD= 1.75)</p> <p>104 (49.3%) boys 107 (50.3%) girls</p>	Food advertised	Non advertised food		<p>Children's perception</p> <p>Unhealthy Eaters groups (n= 100) children perceive advertised food products vs non-advertised food as:</p> <ul style="list-style-type: none"> healthier [mean difference (MD)= 0.49 (mean 3.22 vs 2.73), p<0.01] tastier [MD 0.44 (mean 3.42 vs 2.98) p<0.01] more fashionable [MD 0.39 (mean 3.69 vs 3.30) , p<0.01] more nutritious [MD 0.41 (mean 3.04 vs 2.63) p<0.01] <p>Healthy Eaters groups children (n=111) perceive advertised food vs non-advertised food as:</p> <ul style="list-style-type: none"> tastier [MD 0.0.31 (mean 3.24 vs 2.93) p<0.01] more fashionable [MD 0.44 (mean 3.64 vs 3.20) p<0.01] 	

Table 10. Qualitative assessment of advertised and non-advertised food products and mean differences in the two clusters

	Unhealthy eaters			Healthy lifestyle followers		
	Advertised food	Non advertised food	Mean difference	Advertised food	Non advertised food	Mean difference
Healthy	3.22	2.73	0.49 (t = 6.24**)	2.36	2.31	0.05 (t = 1.42*)
Tasty	3.42	2.98	0.44 (t = 6.70**)	3.24	2.93	0.31 (t = 5.26**)
Fashionable	3.69	3.30	0.39 (t = 5.20**)	3.64	3.20	0.44 (t = 6.56**)
Cheap	2.72	2.69	0.03 (t = 0.73*)	2.46	2.41	0.05 (t = 1.75*)
Of good quality	3.23	3.10	0.13 (t = 2.24*)	3.01	2.93	0.08 (t = 1.58*)
Nutritious	3.04	2.63	0.41 (t = 5.44**)	2.37	2.32	0.05 (t = 1.92*)

*Significant at the 0.05 level.
 **Significant at the 0.01 level.
 ns, not significant.

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	<p>children's perception on the qualitative assessment of food products</p> <p>For the influence of advertising on children's perception, participants were asked to recall an advertisement of food product</p> <p>Then, they were asked to indicate the degree to which they believe that the advertised product has six different characteristics (healthy, tasty, fashionable, cheap, nutritious, and of good quality) with a scale of 1 (not at all) to 4 (very much)</p> <p>After completing the other questions (about 45 minutes later), children were asked to evaluate the same characteristics of a hypothetical (and, hence, non-advertised) product of the same category, by using the same scale</p> <p>Lifestyle scale were measured using: LAS (Leisure activity scale) CFCFQ (Children's food consumption frequency questionnaire) CRAQ (Children's response of advertising questionnaire)</p> <p>The three sub-scales of CFCFQ and the LAS were used as clustering variables in a cluster scheme, in order to classify children according to their lifestyle and food preferences</p> <p>The first cluster consists of 100 children (47.4% of the total sample),</p>						<p>Frequency of food consumption</p> <ul style="list-style-type: none"> Frequency of unhealthy eating in the unhealthy eaters cluster increases for children influenced by the entertaining dimension of advertising (standardised coefficient =0.20; P = 0.047), but not by parents' education (standardized coefficient=-0.25; P = 0.017) Obese children indicate higher motivational arousal to consume unhealthy food (standardised coefficient =0.45, p=0.025) after the exposure to advertisements 	

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	<p>who include in their diet increased consumption of unhealthy food, have a limited consumption of healthy food, and follow a sedentary lifestyle. Consequently, the cluster was named 'Unhealthy Eaters'.</p> <p>The second cluster includes 111 children (52.6% of the total sample), who frequently consume healthy foods, avoid unhealthy food products, and have adopted a more active lifestyle. Hence, the cluster was named 'Healthy Lifestyle Followers'.</p> <p>In order to examine the relative influence of children's responses to advertising on the frequency of consumption of unhealthy food we created three regression models, one for each cluster and another one for obese children. Participants' scores in the four CRAQ sub-scales and demographic variables were used as predictors</p>							

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<p>10.Ueda P, Tong L, Viedma C et al. Food marketing towards children: Bran Logo Recognition, Food-related Behaviour and BMI among 3 – 13 years old in a South Indian Town. Plos One. 2012; 7 (10): 1-7</p> <p>Sweden</p>	<p>Study design: Cross-sectional study</p> <p>Objective: To assess exposure to marketing of unhealthy food products and its relation to food related behavior and BMI in children aged 3–13, from different socioeconomic backgrounds in a south Indian town.</p> <p>Methods</p> <p>Child-parent pairs were recruited at pediatric clinics.</p> <p>Exposure to food marketing was assessed by a digital logo recognition test. Brand logo recognition – as first developed by Fischer et al. was used as a measure of exposure to marketing activities.</p> <p>The logo recognition was tested by assessing the child's ability to match a logo to a corresponding product category. Logos were chosen from a wide range of soft drink, junk food, snacks and sweets products from both Indian and international companies.</p> <p>Children matched 18 logos of unhealthy food (high in fat/sugar/salt) featured in promotion material from the food industry to pictures of corresponding products.</p>	II-3	<p>Child-parent pairs (n=306)</p> <p>Ranged in age from 3 to 13 years and average age was 7.6 years (SD=2.8).</p> <p>One-hundred and seventy-seven (58%) were boys.</p>	Unhealthy food marketing- Logo			<p>Brand logo recognition out of (0-18) score:</p> <ul style="list-style-type: none"> Average score was 9.8 (SD=4.3) or 54% correct answer Children in the high socioeconomic status (SES) group scored significantly higher on the brand logo test [mean brand logo score was 10.7 (SD=4.2)] compared to children from the low SES group [mean brand logo score was 8.5 (SD=4.0)] (p<0.001) <p>Nutritional knowledge out of (0-10) score:</p> <ul style="list-style-type: none"> Average score was 7.4 (SD=2.1) Children from the high SES group received higher score on the nutritional knowledge test [mean was 8.1 (SD=1.8)] compared to the low SES group [mean was 6.1 (SD=2.1)] (p<0.001) <p>Preferences out of (0-10) score:</p> <ul style="list-style-type: none"> Average score was 4.5 (SD=2.1) Preferences did not differ between the high SES group [mean score was 4.5 (SD=2.2)], low SES group [mean score was 4.5 (SD=1.9)] (p=0.92). <p>Purchase requests out of (1-4) score:</p> <ul style="list-style-type: none"> Average score was 2.6 (SD=0.68) High SES children had a more frequent reported purchase request behaviour [mean was 2.7 (SD=0.61)] compared to the low SES group [mean was 2.4 (SD=0.71)] (p=0.003) <p>Eating behaviour out of (1-3) score:</p> <ul style="list-style-type: none"> Average score was 1.7 (SD=0.45) The low SES group had higher eating behaviour score [mean was 1.8 (SD=10.47)] compared to middle SES group [mean was 1.6 (SD=0.43)] (p=0.002) <p>Body mass index (BMI):</p> <ul style="list-style-type: none"> Average mean was 15.4 (SD=3.1) Children in lowest SES group had a lower BMI 	

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	<p>Children's nutritional knowledge, food preferences, purchase requests, eating behavior and socioeconomic characteristics were assessed by a digital game and parental questionnaires. The questionnaire was fashioned after a scale developed in the U.S. by Calfas et al. and modified to suit an Indian setting</p> <p>Anthropometric measurements were also recorded.</p>						<p>[mean was 14.4 (SD=1.9)] compared to high SES group[mean was 16.1 (SD=3.8)] (p<0.001)</p> <ul style="list-style-type: none"> 2% of the children in low SES group were overweight compared to 19% in high SES group (p<0.001) <p>Linear regression:</p> <ul style="list-style-type: none"> Brand logo score was associated to higher BMI association was 0.128 (95% CI: 0.018, 0.238)] (p=0.022) No correlation between brand logo recognition and eating behaviour [association was 0.013 (95% CI: -0.003, 0.028)] (p=0.113) No correlation between brand logo recognition and purchase request behaviour [association was -0.017 (95% CI: -0.041, 0.006)] (p=0.140) <p>Poisson regression:</p> <ul style="list-style-type: none"> There was positive relationship between brand logo recognition and nutritional knowledge [association was 0.034 (95% CI: 0.020, 0.047)] p<0.001 No correlation between brand logo recognition and preference [association was 0.006 (95% CI: -0.010, 0.023)] p<0.453 	

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11.Ng SH, Kelly B, Se CH et al. Reading the mind of children in Response to food advertising: a cross-sectional study of Malaysian school children's attitudes towards food and beverages advertising on television. BMC Public Health.2015; 15: Malaysia	<p>Study design Cross-sectional study</p> <p>Objective To investigate children's attitude towards television food advertising (TVFA) by examining four well-cited induction factors namely advertisement recognition, favourite advertisement, purchase request and product preference</p> <p>Methods Malaysian urban school children of equal ethnic distribution was voluntarily recruited</p> <p>Data collection was carried out from June to December 2013</p> <p>An interview-administered questionnaire was developed and been through pilot testing process</p> <p>The questionnaire was organized to provide: -Background information -Induction factors and food advertisement album [consist of core food (n=9) and non-core food (n=15)]</p> <p>Core food defined as low-calorie, nutrient dense food product</p> <p>Non-core food defined as foods high in fat, refined sugar and salt (HFSS)</p> <p>Subjects were required to indicate</p>	II-3	<p>N=402</p> <p>School children age 7 to 12 years</p>	Food advertisement album [consist of core food (n=9) and non-core food (n=15)]	No		<p><u>Recognition</u> Median score non-core food 0.93 (95% CI: 0.80 , 1.00) Median score core food 0.78 (95% CI: 0.56, 0.89) p<0.001</p> <p><u>Favourite advertisement</u> Median score non-core food 0.73 (95% CI: 0.53, 0.87) Median score core food 0.44 (95% CI: 0.22, 0.56) p<0.001</p> <p><u>Purchase request</u> Median score non-core food 0.60 (95% CI: 0.40, 0.80) Median score core food 0.33 (95% CI: 0.11, 0.44) p<0.001</p> <p><u>Product preference:</u> Median score non-core food 0.73 (95% CI: 0.60, 0.87) Median score core food 0.44 (95% CI: 0.22, 0.56) p<0.001</p> <p><u>Univariate analysis</u> Advertisement recognition significantly (p<0.05) associated with: <ul style="list-style-type: none"> TV viewing time (IRR: 1.03; 95 % CI: 1.01, 1.04) ethnicity (Malay vs non-Malay, IRR: 1.14; 95 % CI: 1.08, 1.20) Favourite advertisement was significantly (p<0.05) associated with: <ul style="list-style-type: none"> TV viewing time (IRR: 1.07; 95 % CI: 1.04,1.09) Age (IRR: 0.98; 95 % CI: 0.96, 0.99) Ethnicity (Malay vs non Malay, IRR: 1.11; 95 % CI: 1.05, 1.19) Daily pocket money (IRR: 0.98; 95 % CI: 0.96, 0.99) </p>	

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	<p>'yes' (coded as "1") or 'no' (coded as "0") for each listed food product on the questionnaire sheet by referring to the food album for pictures of the advertised product.</p> <p>The feedback was obtained for each induction factor which included</p> <ul style="list-style-type: none"> (i) advertisement recognition (ii) favourite advertisement (iii) purchase request (iv) product preference <p>Data interpretation</p> <p>All time-related factors such as physical activity, internet surfing and TV viewing during the past one week were reported as daily time spent in hours.</p> <p>Subject response to each induction factor was differentiated as per core (n=9) and non-core (n=15) food categories.</p> <p>Median scores for each induction factor (ranging from 0.00 to 1.00) were computed based on sum of food items in agreement (yes) divided by total number of food products for core or non-core food categories.</p> <p>Result was presented in incidence rate ratios (IRR)</p>						<p>Purchase request significantly ($p < 0.05$) associated with:</p> <ul style="list-style-type: none"> • TV viewing time (IRR: 1.06; 95 % CI: 1.04, 1.09) • Gender (IRR: 1.07; 95 % CI: 1.01, 1.14) • Age (IRR: 0.96; 95 % CI: 0.94, 0.98) • Ethnicity (Malay vs non Malay, IRR: 1.17; 95 % CI: 1.09, 1.25) • Physical activity level (1–3 times vs less than once weekly, IRR: 1.24; 95 % CI: 1.06, 1.45) • Physical activity level (4–6 times vs less than once weekly, IRR: 1.25; 95 % CI: 1.06, 1.48) <p>Product preference was significantly ($p < 0.05$) associated with:</p> <ul style="list-style-type: none"> • Children's TV viewing time (IRR: 1.05; 95 % CI: 1.03, 1.07) • Ethnicity (Malay vs non-Malay, IRR: 1.41; 95 % CI: 1.07, 1.21). <p>Multivariate analysis</p> <p>When corrected for other variables, TV viewing time was significant ($p < 0.001$) with:</p> <ul style="list-style-type: none"> • Favourite advertisement (IRR_{final} adj: 1.06; 95 % CI: 1.04, 1.08) • Purchase request (IRR_{final} adj: 1.06; 95%CI: 1.04, 1.08) • Product preference (IRR_{final} adj: 1.04; 95 % CI: 1.02, 1.07) <p>Not significant with:</p> <ul style="list-style-type: none"> • Advertisement recognition (IRR_{final} adj: 1.02; 95% CI: 1.00, 1.04) <p>Author's conclusion:</p> <p>The findings indicate that food industries in Malaysia have successfully manipulated the mind of children by using attractive TV commercials, promoting purchase requests and instilling early childhood preference for non-core food.</p>	

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12.Boyland EJ, Harrold JA, Kirkham TC et al. Food commercials increase preference for Energy Dense Food, particularly in Children who watch more television. Paediatrics.2011; 128:93-100 UK	<p>Study design Cross sectional study</p> <p>Objective To determine if levels of television viewing (a proxy measure for habitual commercial exposure) affect children's food preference responses to television food commercials</p> <p>Methods This study was a within-subject, counterbalanced With 2-week interval between conditions to minimize the likelihood that children would recall their responses from the first study day.</p> <p>On test days, children were shown a DVD in their classrooms. For the control condition, children viewed the DVD containing 10 toy commercials followed by the cartoon.</p> <p>For the experimental condition, children viewed the DVD containing 10 food commercials followed by the same cartoon.</p> <p>On both occasions, immediately after viewing, children were given 3 food preference measures and a commercial recognition measure to complete individually.</p> <p>Food Preference Measures: 1.The Leeds Food Preference Measure (LFPM) 2.The Adapted Food Preference Measure (AFPM)</p>	II-3	<p>281 participants</p> <p>Aged 6 to 13 years (mean [SEM]: 9.5 [0.1] years)</p>	Food commercial	Toy commercial		<p>Effects on preference on non-branded item</p> <ul style="list-style-type: none"> All children selected more non branded items from the LFPM after food commercials [mean 15.5 (6.4 standard deviation (SD)) compared with toy commercials [mean 14.1 (6.7 SD)] ; [95% confidence interval (CI): 0.742, 2.084], p <0 .001 Children selected significantly more non-branded carbohydrate [mean 4.3 (2.0 SD) vs mean 3.9 (2.2 SD); (95% CI: 0.169, 0.621); p =0 .001] items after food commercials compared with after toy commercials Children selected significantly more non-branded fat [mean 4.7 (1.9 SD) vs mean 4.2 (2.0 SD); (95% CI:0.224, 0.637); p<0.001] items after food commercials compared with after toy commercials <p>Effects on preference on branded item</p> <ul style="list-style-type: none"> All children selected more branded items from the AFPM after food commercials compared with after toy commercials [mean 9.1 (3.7SD) vs mean 8.4 (4.2 SD); (95% CI: 0.389, 1.078) p < 0.001] Children selected significantly more branded carbohydrate [mean 4.2 (2.1 SD) vs mean 3.9 (2.3 SD); (95%CI:0.149, 0.563); p =0 .001] items after food commercials compared with after toy commercials Children selected significantly more 	

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	<p>3.The Leeds Forced Choice Test (LFCT)</p> <p>On the first test day only, children were also given a television viewing questionnaire (a proxy measure for habitual advertising exposure) to complete.</p> <p>On the second (final) study day only, children's height (meters) and weight (kilograms) were measured.</p>						<p>branded fat [mean 4.9 (2.2 SD) vs mean 4.5 (2.2 SD); (95% CI: 0.180, 0.574) ; p <0 .001] items after food commercials compared with after toy commercials</p> <p>Effect of TV viewing time on preference</p> <ul style="list-style-type: none"> High television viewers selected significantly more branded items [mean 19.4 (7.4 SD) vs mean 15.4 (6.8 SD); (95% CI: 2.375, 5.706); p <0.001] than low television viewers overall High television viewers selected significantly more non-branded items [mean 18.3 (6.4 SD) vs mean 15.8 (6.2 SD); (95% CI: 1.062, 4.018); p =0 .001] than low television viewers overall. High television viewers selected significantly more branded than non-branded items [mean 19.4 (7.4 SD) vs mean 18.3 (6.4 SD); (95% CI: 0.414, 1.854); p = 0.002] <p>Effect of TV viewing on BMI</p> <ul style="list-style-type: none"> BMI SD score was significantly higher in the high TV viewing group than in low TV viewing group [mean 0.76 (1.3 SD) vs mean 0.37 (1.1 SD); (95% CI: 0.102, 0.677); p =0 .008]. <p>Recognition</p> <ul style="list-style-type: none"> Children correctly recognized more food than toy commercials [mean 7.8 (1.5 SD) vs mean 7.5 (1.8 SD); (95% CI: 0.060, 0.569); p =0 .016] 	

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13.Totu A, Igau OA, Halik M. TV commercials and choice of food among children in Sabah, Malaysia. IOSR-JHSS.2013; 15(6):81-89 Malaysia	<p>Study design Pre and post Intervention</p> <p>Objective To examine the relationship between television advertising and patterns of food choice among children</p> <p>Methods Participants were selected from school children aged 7-12 years old from SK Tabobon, Sabah</p> <p>They were divided into 2 groups randomly</p> <p>Both groups were shown a mixture of 2 different cartoon video clips.</p> <p>A stream advertising (duration: 5 minutes) were inserted in between the cartoon clips. The length of advertisement which is 25% of the total cartoon video clip was equivalent to the length of advertising time in the actual TV programme (15 minutes/ 1 hour show)</p> <p>The children were presented with pictures of food and drinks: fast food available in quick food restaurants; foods such as ice cream, chocolate and candy; and local food and fruits and were asked to tick the food and drink of their choice from the pictorial list</p>	II-3	<p>50 participants Children from 7-12 years old</p> <p>Divided into 2 categories: Middle childhood (7-10 years old) Early adolescence (11-12 years old)</p>	Food advertisement	Non food advertisement		<p>Food choice</p> <ul style="list-style-type: none"> Children who were exposed to food related advertisement were more likely to choose fast food ($r=0.418$) than those who not ($r=0.309$), $p<0.001$ Older children's (11-12 years old) [mean:13.07 ,SD:2.45) appear less inclined to select fast food as compared to those in younger children (7-10 years) [mean:14.25, SD:2.81] $p<0.05$ after exposure to food advertisement Female [mean:13.91 ,SD:2.39) appear less inclined to select fast food as compared to male [mean:14.44, SD:3.88] $p<0.05$ after exposure to food advertisement 	

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14.Ghimire N and Rao A. Comparative evaluation of the influence of television advertisements on children and caries prevalence. Glod Health Action.2013; 6: 1-8 India	<p>Study design Cross sectional study</p> <p>Objective to evaluate the influence of television advertisements on children, the relationship with oral health and to analyse the content of those advertisements</p> <p>Methods The questionnaire-based study was performed among 600 (aged 10-13 years old) schoolchildren of Mangalore, Karnataka, followed by oral examination.</p> <p>Based on the survey, favorite and non-favorite channels and viewing times were analyzed.</p> <p>Advertisements on children's favorite and non-favorite channels were then viewed, analyzed, and compared.</p> <p>Dental caries of all the participating children were recorded using DMFT/dmft index</p>	II-3	600 (aged 10-13 years old) school children participated	Food advertisement			<ul style="list-style-type: none">Out of 281 advertisement on children's favorite channels, 162 (57.65%) were for food product [142 (87.65%) of them were cariogenic food]Children who watched television advertisements and asked for food items and soft drinks were found to have more caries and DMFT permanent and dmft deciduous <p>1.Correlation between watched advertisement in between programs and DMFT/dmft score</p> <table><tr><th>Watched advertisement in between programs</th><th>DMFT permanent</th><th>Dmft deciduous</th></tr><tr><td>Yes (445)</td><td>213 (47.87%) p<0.001</td><td>193 (43.37%) p<0.012</td></tr><tr><td>No (155)</td><td>38 (24.52%)</td><td>38 (24.52%)</td></tr></table> <p>2.Correlation between purchase of advertised food and DMFT/dmft score</p> <table><tr><th>Purchased of advertised food</th><th>DMFT permanent</th><th>Dmft deciduous</th></tr><tr><td>Yes (396)</td><td>194 (48.99%) p<0.001</td><td>178 (44.94%) p<0.001</td></tr><tr><td>No (204)</td><td>57 (27.94%)</td><td>53 (25.98%)</td></tr></table> <p>3.Correlation between purchase of advertised soft drinks and DMFT/dmft score</p> <table><tr><th>Purchased of advertised soft drinks</th><th>DMFT permanent</th><th>Dmft deciduous</th></tr><tr><td>Yes (291)</td><td>146 (50.17%) p<0.003</td><td>138 (47.42%) p<0.001</td></tr><tr><td>No (309)</td><td>105 (33.98%)</td><td>93 (30.09%)</td></tr></table>	Watched advertisement in between programs	DMFT permanent	Dmft deciduous	Yes (445)	213 (47.87%) p<0.001	193 (43.37%) p<0.012	No (155)	38 (24.52%)	38 (24.52%)	Purchased of advertised food	DMFT permanent	Dmft deciduous	Yes (396)	194 (48.99%) p<0.001	178 (44.94%) p<0.001	No (204)	57 (27.94%)	53 (25.98%)	Purchased of advertised soft drinks	DMFT permanent	Dmft deciduous	Yes (291)	146 (50.17%) p<0.003	138 (47.42%) p<0.001	No (309)	105 (33.98%)	93 (30.09%)	
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15.Tatlow-Golden M, Hennessey E, Dean M et al. Young children's food brand knowledge. Early development and associations with television viewing and parent's diet. Appetite. 2014;80:197-203 Ireland	<p>Study design Cross sectional study</p> <p>Objective To identify the development and determinants of children's early food brand knowledge, for brands highly advertised on television</p> <p>Methods Study formed part of a larger project examining aspects of preschooler's food, drink and advertising related knowledge and practices</p> <p>Parents gave information about family demographics, eating habits and children's television viewing through questionnaire</p> <p>Children were interviewed individually by one of five experienced researchers consist of naming the brand and product type</p> <p>Children were then asked to match the board of food and drink images with brand logo images</p>	II-3	<p>Children (n=172)</p> <p>Aged 3-5 years</p>	Advertised brands	-		<p>Knowledge For product naming comparisons indicated that scores at 3 years (M=3.98, SD=2.06) differed significantly from those at 4 years (M = 5.04, SD = 2.18), but not between 4 and 5 years (M=5.41, SD=2.32).</p> <p>For visual recognition (matching), comparisons indicated that, scores at 3-year-olds' scores (M=4.31, SD=2.26) differed significantly from 4-year-olds' (M=6.01, SD = 2.29), but scores did not differ significantly between 4 and 5 years of age (M=6.89, SD=2.00).</p> <p>Children had significantly higher brand knowledge of unhealthy foods than healthy ones for :</p> <ul style="list-style-type: none"> brand names: unhealthy (mean:2.21, sd:1.38) vs healthy (mean:0.62, sd:0.88) p<0.001 product types: unhealthy (mean:3.40, sd:1.59) vs healthy (mean:1.39, sd:1.18) p<0.001 visual recognition: unhealthy (mean:3.82, sd:1.45) vs healthy (mean:1.85, sd:1.36) p<0.001 <p>Children's unhealthy brand knowledge was significantly positively related to their TV viewing: brand name(r=0.255,p=0.006), product type (r=0.368, p<.001) and image matching (r=0.298, p=0.001)</p> <p>Children's unhealthy brand knowledge was significantly negatively related to their healthy eating : brand name(r=-0.499,p<0.001), product type (r=-0.452, p<0.001) and image matching (r=-0.289, p=0.002)</p>	

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							<p>Children's unhealthy brand knowledge was significantly negatively related to their parents' healthy eating: brand name($r=-0.543, p<0.001$), product type ($r=-0.481, p<0.001$) and image matching ($r=-0.233, p=0.011$)</p> <p>Children's unhealthy brand knowledge was significantly negatively related to their mothers' education : brand name($r=-0.309, p=0.001$), product type ($r=-0.389, p<0.001$) and image matching ($r=-0.225, p=0.013$)</p>	