



# Food advertising during children's television programmes in Italy

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## Abstract

**Objective:** Previous studies from European countries noted that food products promoted on TV for children did not comply with international guidelines, including the World Health Organization European Nutrient Profile Model (WHO-ENPM) and the EU Pledge Nutrition Criteria (EU-PNC, an initiative developed by leading food companies). We aim to provide new data from Italy.

**Design:** Evaluation of Italian TV advertisements. Data on nutritional values for food product advertised were compared with nutritional standards issued by the WHO-ENPM and the EU-PNC.

**Setting:** In total, 180 h of TV programmes from six Italian channels, 2016–2017.

**Participants:** Eight hundred and ten consecutive advertisements during children's programmes.

**Results:** Out of 810 advertisements, 90 (11.1 %) referred to food products. Among these, 84.5 % of the foods promoted did not meet the WHO-ENPM and 55.6 % the EU-PNC guidelines. Advertisements promoting sweet and salty snacks (i.e.  $\geq 70$  % of all foods) *v.* other food products showed higher non-compliance with both the WHO-ENPM (OR: 73.8; 95 % CI: 4.09, 1330) and the EU-PNC (OR: 9.21; 95 % CI: 2.82, 30.1).

**Conclusions:** In Italy, most food advertisements during children's programmes are not compliant with European nutritional standards. Almost all the advertisements for snacks do not meet international guidelines. As the WHO-ENPM guidelines do not propose standards for all the food products, including meals, there is an urgent need to define independent and easy-to-read guidelines for food advertisements targeting children. As a first step towards the complete ban of food advertisements targeting children recommended by other researchers, these guidelines should be enforced by all the TV broadcasts.

**Keywords**  
Food  
Advertisement  
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EU Pledge Nutrition Criteria  
WHO Advertisement Guidelines  
Television

Childhood obesity, which has doubled since 1980 in high- and middle-income countries<sup>(1)</sup>, results in a higher risk in later adulthood of obesity and chronic diseases, including type 2 diabetes, CVD, kidney disease, cancer and premature death<sup>(2–6)</sup>.

Unhealthy diet and nutrition in children increase the risk for childhood obesity<sup>(7)</sup>. The widespread presence of non-core foods advertised during children's TV programmes boosts the risk of an unhealthy diet among children and adolescents<sup>(8)</sup>. During or shortly after exposure to unhealthy dietary advertisements, children's preferences for nutritionally poor food and sugary beverages increase<sup>(9,10)</sup>.

Compared to adults, children are particularly vulnerable to the advertisements since they cannot grasp the persuasive intent of marketing<sup>(9,11,12)</sup>. Thus, evidence suggests that children exposed to unhealthy food advertisements have a greater risk of childhood obesity<sup>(13)</sup>.

To promote healthy foods and beverages to children, typically under the age of 12, several organisations – not only those independent of the food industry – have issued guidelines to set nutritional standards for foods advertised to children<sup>(14–16)</sup>. The WHO developed the European Nutrient Profile Model (WHO-ENPM) for food marketing for children in Europe<sup>(13,16)</sup>. Similarly, leading European

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food companies have drawn up guidelines for food advertisements, called the EU Pledge Nutrition Criteria (EU-PNC)<sup>(15,17)</sup>, that should be applied to all EU Member States, including Italy. These guidelines do not permit advertisements of selected food items, including chocolate and other sugar products, and set the thresholds for energy intake and various nutrients that should not be exceeded by marketed food products<sup>(13,16)</sup>. In general, the WHO-ENPM has stricter nutritional standards than the EU-PNC. For example, the WHO-ENPM does not permit selected products that EU-PNC allow under certain circumstances. These include fruit/vegetable juices, sweet biscuit, cereal-based products and edible ices<sup>(18)</sup>.

To our knowledge, few studies have investigated the compliance with national or international guidelines of the foods promoted on television, but the majority of foods targeting children did not meet these nutritional standards<sup>(19–28)</sup>. These findings are in apparent contrast with reports backed by the industry, showing that, using the same guidelines, almost all the foods promoted were compliant<sup>(29)</sup>.

In Europe, studies from Malta<sup>(30)</sup>, Switzerland (including one Italian and one German TV channel)<sup>(31)</sup>, Germany<sup>(24)</sup> and Slovenia<sup>(20)</sup> observed that more than 70 % of advertisements broadcast during children's viewing hours promoted unhealthy foods. The study from Germany also compared foods advertised to children before and after the EU-PNC, finding even a rise in the proportion of non-core food advertisements<sup>(24)</sup>. Two large studies from Austria and Slovenia noted that more than 90 % of the foods promoted on Slovenian television in 2013<sup>(20)</sup> and Austrian television in 2014<sup>(19)</sup> did not comply with the WHO-ENPM and the EU-PNC guidelines, respectively.

The current study analysed the content of the food advertisements during children's programmes broadcasted on Italian TV channels, investigating compliance with the WHO-ENPM and the EU-PNC criteria. It is important to analyse the issue in Italy, a country with currently no specific protocol regulating TV food advertisements targeting children.

## Methods

### Data collection

Between October 2016 and January 2017, a total of 180 h of TV programmes were recorded from the six most viewed Italian TV channels, according to official Italian 2015 TV database (i.e. Auditel; <http://www.auditel.it/dati/>): RAI 1 and RAI 3 (most popular public channels); Canale 5, Italia 1 and La7 (most popular private channels); Boing (first popular private channel for children) (Table 1). For each channel, data were collected at three different periods during the day: afternoon (12.00–14.00), early evening (16.00–18.00) and late evening (20.30–22.30) and on 4 days during the weekdays (Monday–Thursday) and 1 day

**Table 1** Daily average share of the Italian TV channels selected for the study

| TV channel | Broadcasting company | Daily average share (%) <sup>*</sup> | Rank in Italy |
|------------|----------------------|--------------------------------------|---------------|
| RAI 1      | RAI (Public)         | 17.8                                 | 1             |
| Canale 5   | Mediaset (Private)   | 15.7                                 | 2             |
| RAI 3      | RAI (Public)         | 6.8                                  | 3             |
| Italia 1   | Mediaset (Private)   | 5.5                                  | 5             |
| La7        | La7 (Private)        | 3.2                                  | 7             |
| Boing      | Mediaset (Private)   | 0.9                                  | 2†            |

<sup>\*</sup>Data from the official Italian 2015 TV database (<http://www.auditel.it/dati/>).

†Rank based on TV channels for children only.

during the weekend (Sunday). The time periods selected best identify the main moments of the day where Italians – in particular children – eat: lunch time, snack time and dinner time, respectively.

TV programmes were recorded on DVD by connecting a laptop to the TV network and setting an automatic TV recording on the pre-defined days and times. One investigator (CS) watched the recorded hours of television to identify and archive all the advertisements. In 180 h of television, we recorded 3789 advertisements. Besides detailed data on the programme during which each advertisement was broadcast, including channel, day, time and programme category (e.g. movie, fiction, talk show, cartoon and news), information was collected on the name and type of the product promoted (food, beverage, health, technology, clothes, vehicles, accessories, toys, home and others). TV programmes and products categories were *a priori* defined based on our experience or previous publications<sup>(31)</sup> and then were adapted according to the programmes recorded and the products advertised.

Of the 3789 advertisements, 2979 (78.6 %) targeted adults and 810 (21.4 %) children, defined as advertisements broadcast during cartoons or children's fiction programmes, or those on Boing, this being a TV channel devoted solely to children.

All advertised food products and beverages targeting children were then searched online on the basis of their brand and product name, to obtain their nutritional values. Most data were retrieved from the website of one of the biggest Italian grocery stores (Esselunga) or the official company websites (if the information was not available on Esselunga). Nutritional values per 100 g of product included energy (kcal), salt (g), total fats (g), saturated fats (g), carbohydrates (g), total sugars (g), fibre (g) and proteins (g) (see online supplementary material, Supplemental Table 1). We used the formula: 1 g Na = 2.5 g salt to obtain values for Na from salt, and vice versa. We also collected portion size (g) and energy per portion (kcal). To obtain the nutritional values of meals – we only observed McDonald's Happy Meal – we collected for every dish category (main meal, side dish, beverage and dessert) the values for each single item. Total nutritional meal values were calculated by adding

**Table 2** Distribution of all recorded advertisements, according to product category, overall and by target (adults and children). Italy, 2016–2017

| Product category                | Total no. | %     | Target no. |       |          |       |
|---------------------------------|-----------|-------|------------|-------|----------|-------|
|                                 |           |       | Adults     | %     | Children | %     |
| Total                           | 3789      | 100.0 | 2979       | 100.0 | 810      | 100.0 |
| Foods and beverages             | 987       | 26.0  | 897        | 30.1  | 90       | 11.1  |
| Food                            | 865       | 22.8  | 786        | 26.4  | 79       | 9.8   |
| Alcohol-free beverages          | 122       | 3.2   | 111        | 3.7   | 11       | 1.4   |
| Toys                            | 639       | 16.9  | 13         | 0.4   | 626      | 77.3  |
| Health                          | 592       | 15.6  | 560        | 18.8  | 32       | 4.0   |
| Technology                      | 545       | 14.4  | 528        | 17.7  | 17       | 2.1   |
| Car/motorcycles and accessories | 271       | 7.2   | 264        | 8.9   | 7        | 0.9   |
| Home                            | 180       | 4.8   | 176        | 5.9   | 4        | 0.5   |
| Clothing                        | 132       | 3.5   | 116        | 3.9   | 16       | 2.0   |
| Alcoholic beverages             | 50        | 1.3   | 50         | 1.7   | 0        | 0     |
| Animals                         | 45        | 1.2   | 45         | 1.5   | 0        | 0     |
| Other                           | 203       | 5.4   | 196        | 6.6   | 7        | 0.9   |
| Missing                         | 145       | 3.8   | 134        | 4.5   | 11       | 1.4   |

the means of each dish category (see online supplementary material, Supplemental Table 2).

Identified food products were classified into categories according to the WHO-ENPM (seventeen categories, see online supplementary material, Supplemental Table 3)<sup>(16)</sup> and EU-PNC (nine categories, see online supplementary material, Supplemental Table 4)<sup>(15)</sup>. It was possible to categorise all the food products according to both guidelines, except for McDonald's Happy Meal which was not categorised according to the WHO-ENPM, as this guideline has no a specific category for meals.

A food-type variable was created to distinguish sweet and salty snacks (including chocolate/sugar products, cakes/biscuits/pastries, savory snacks, edible ices, cereal-based products and fast food meals) from other food products.

### Statistical analyses

We considered absolute and relative frequencies to describe the advertisements according to the TV channel, time, target and product category. To assess compliance of each product with the international guidelines for food advertisements targeting children, we compared the nutritional values of the product to the component-specific nutrient thresholds provided by WHO-ENPM and EU-PNC. Total compliance was defined as compliance for all the different nutritional components. The nutritional components considered according to WHO-ENPM include energy, salt, total fats, saturated fats and total sugars. According to EU-PNC, nutritional components include energy, Na, saturated fats and total sugars.

We considered multiple logistic regression models to compute OR, and their corresponding 95% CI, for non-compliant *v.* compliant food advertisements targeting children. Statistically significant estimates in the univariate models were used as adjusting variables in the multivariate

models. All the models were adjusted by TV channel and food type (snacks *v.* products other than snacks). The level of statistical significance was set to a two-sided *P*-value < 0.05. All analyses were conducted using SAS 9.4 (SAS Institute).

### Results

Out of 810 children's advertisements, 90 (11.1%) promoted food and alcohol-free beverages (Table 2). Of these, 65 (72.2%) promoted sweet and salty snacks (including fast food meals) and 25 (27.8%) food products other than snacks. Supplementary Table 5 shows the distribution of various foods according to the WHO-ENPM categories and Supplementary Table 6 according to the EU-PNC categories.

Table 3 shows the distribution of food advertisements targeting children, according to compliance with WHO-ENPM guidelines, overall and by nutrient components (see online supplementary material, Supplemental Table 7 shows the same by WHO-ENPM categories). In all, 84.5% of the advertisements were not compliant: 64.8% for energy intake, 74.7% for salt, 78.9% for total fats, 64.8% for saturated fats and 64.8% for total sugars. Advertisements in cartoons were more frequently non-compliant than fiction with the WHO-ENPM guidelines (multivariate OR: 27.5; 95% CI: 1.71, 443). More than 90% of the advertisements for sweet and salty snacks were not compliant for each component of the WHO-ENPM guideline, and 100% were not compliant with all the nutrient components combined. Consequently, we found a direct relationship between advertised food type (snacks compared with other than snack foods) and non-compliance with the WHO-ENPM guideline (OR 67.5; 95% CI: 3.75, 1214). No significant relationships were found for TV channel, time or day of the week.



**Table 3** Distribution of non-compliant food advertisements targeting children according to the WHO European Nutrient Profile Model (WHO-ENPM), and corresponding odds ratios (OR) and 95% confidence intervals (CI)\*, overall and by nutritional components, Italy 2016–2017

|                        | Non-compliant with WHO-ENPM guidelines for ... |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
|------------------------|--|-------|-------|------------|-------------------|-------|------------|----------|-------|------------|----------------|------|------------|-------------------|-------|------------|------------------|-------|------------|
|                        | ... all components combined                    |       |       |            | ... energy intake |       |            | ... salt |       |            | ... total fats |      |            | ... saturated fat |       |            | ... total sugars |       |            |
|                        | <i>n</i> †                                     | %     | OR    | 95% CI     | %                 | OR    | 95% CI     | %        | OR    | 95% CI     | %              | OR   | 95% CI     | %                 | OR    | 95% CI     | %                | OR    | 95% CI     |
| Total                  | 71   | 84.5  |       |            | 64.8              |       |            | 74.7     |       |            | 78.9           |      |            | 64.8              |       |            | 64.8             |       |            |
| TV channel             |  |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
| Boing                  | 41   | 80.5  | 1.00§ |            | 73.2              | 1.00§ |            | 70.7     | 1.00§ |            | 80.5           | 1.00 |            | 70.7              | 1.00§ |            | 70.7             | 1.00§ |            |
| Italia 1               | 30   | 90.0  | 4.00  | 0.74, 21.5 | 53.3              | 0.42  | 0.16, 1.14 | 80.0     | 4.09  | 0.79, 21.3 | 76.7           | 0.91 | 0.23, 3.54 | 56.7              | 0.32  | 0.06, 1.81 | 56.7             | 0.32  | 0.06, 1.81 |
| Type of programme      |  |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
| Fiction                | 15   | 60.0  | 1.00§ |            | 53.3              | 1.00§ |            | 60.0     | 1.00§ |            | 60.0           | 1.00 |            | 53.3              | 1.00§ |            | 53.3             | 1.00§ |            |
| Cartoon                | 56   | 91.1  | 27.5  | 1.71, 443  | 67.9              | 1.24  | 0.15, 10.2 | 78.6     | 3.24  | 0.44, 24.2 | 83.9           | 3.87 | 0.78, 19.1 | 67.9              | 1.39  | 0.22, 8.79 | 67.9             | 1.39  | 0.22, 8.79 |
| Time                   |  |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
| 12.00–14.00            | 19   | 89.5  | 1.00§ |            | 73.7              | 1.00§ |            | 79.0     | 1.00§ |            | 84.2           | 1.00 |            | 73.7              | 1.00§ |            | 73.7             | 1.00§ |            |
| 16.00–18.00            | 41   | 85.4  | 0.37  | 0.03, 3.91 | 58.5              | 0.73  | 0.04, 12.6 | 73.2     | 0.23  | 0.02, 2.90 | 78.1           | 0.87 | 0.13, 5.78 | 58.5              | 0.43  | 0.04, 4.28 | 58.5             | 0.43  | 0.04, 4.28 |
| 20.30–22.30            | 11   | 72.7  | 0.20  | 0.01, 3.51 | 72.7              | 1.31  | 0.07, 24.9 | 72.7     | 0.98  | 0.07, 14.5 | 72.7           | 0.79 | 0.15, 4.15 | 72.7              | 1.26  | 0.10, 16.1 | 72.7             | 1.26  | 0.10, 16.1 |
| Day of week            |  |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
| Mon–Fri                | 58   | 82.8  | 1.00§ |            | 60.3              | 1.00§ |            | 70.7     | 1.00§ |            | 77.6           | 1.00 |            | 60.3              | 1.00§ |            | 60.3             | 1.00§ |            |
| Weekend                | 13   | 92.3  | 4.09  | 0.31, 53.6 | 84.6              | 20.3  | 0.88, 470  | 92.3     | 25.8  | 1.27, 524  | 84.6           | 1.41 | 0.21, 9.72 | 84.6              | 9.51  | 0.87, 104  | 84.6             | 9.51  | 0.87, 104  |
| Food type‡             |  |       |       |            |                   |       |            |          |       |            |                |      |            |                   |       |            |                  |       |            |
| Other than snacks      | 26   | 57.7  | 1.00§ |            | 11.5              | 1.00§ |            | 34.6     | 1.00§ |            | 50.0           | 1.00 |            | 15.4              | 1.00§ |            | 15.4             | 1.00§ |            |
| Sweet and salty snacks | 45   | 100.0 | 67.5  | 3.75, 1214 | 95.6              | 116   | 21.4, 639  | 97.8     | 83.1  | 9.77, 707  | 95.6           | 21.4 | 4.26, 107  | 93.3              | 91.85 | 16.36, 516 | 93.3             | 91.85 | 16.36, 516 |

\*OR were estimated from multiple logistic regression models after adjustment for TV channel and food type. Estimates in bold type are significant at 0.05 level.  
 †Nineteen food advertisements related to Happy Meals are excluded since the WHO-ENPM does not consider a category for meals.  
 ‡'Other than snacks' category includes category 4 (beverages), category 7 (yoghurts, sour milk, cream and other similar foods), category 8 (cheese), category 10 (butter and other fats and oils), category 11 (bread, bread products and crisp breads), category 12 (fresh or dried pasta, rice and grains), category 13 (fresh and frozen meat, poultry, fish and similar), category 14 (processed meat, poultry, fish and similar), category 15 (fresh and frozen fruit, vegetables and legumes), category 16 (processed fruit, vegetables and legumes) and category 17 (sauces, dips and dressings). 'Sweet and salty snacks' includes category 1 (chocolate and sugar confectionery), category 2 (cakes, sweets biscuits and pastries; other sweet bakery wares), category 3 (savory snacks), category 5 (edible ices), category 6 (breakfast cereals) and category 9 (ready-made meals and convenience foods and composite dishes).  
 §Reference category.  
 ||Crude OR, with 0.5 added to all cells, as there were some zero cells, causing problems with computation of the OR or its SE<sup>(39,40)</sup>.



**Table 4** Distribution of non-compliant food advertisements targeting children according to the EU Pledge Nutrition Criteria (EU-PNC), and corresponding odds ratios (OR) and 95 % confidence intervals (CI)\*, overall and by nutritional components, Italy 2016–2017

|                        | n  | Non-compliant with EU-PNC for ... |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
|------------------------|----|-----------------------------------|-------|------------|-------------------|-------|------------|------------|-------|------------|-------------------|-------|------------|------------------|-------|-------------|
|                        |    | ... all components combined       |       |            | ... energy intake |       |            | ... sodium |       |            | ... saturated fat |       |            | ... total sugars |       |             |
|                        |    | %                                 | OR    | 95 % CI    | %                 | OR    | 95 % CI    | %          | OR    | 95 % CI    | %                 | OR    | 95 % CI    | %                | OR    | 95 % CI     |
| Total                  | 90 | 55.6                              |       |            | 22.2              |       |            | 38.9       |       |            | 38.9              |       |            | 38.9             |       |             |
| TV channel             |    |                                   |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
| Boing                  | 59 | 47.5                              | 1.00‡ |            | 15.3              | 1.00‡ |            | 30.5       | 1.00‡ |            | 35.6              | 1.00‡ |            | 37.3             | 1.00‡ |             |
| Italia 1               | 31 | 71.0                              | 4.21  | 1.38, 12.9 | 35.5              | 3.40  | 1.19, 9.72 | 54.8       | 3.15  | 1.23, 8.05 | 45.2              | 1.80  | 0.69, 4.74 | 41.9             | 1.63  | 0.56, 4.69  |
| Type of programme      |    |                                   |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
| Fiction                | 17 | 47.1                              | 1.00‡ |            | 23.5              | 1.00‡ |            | 35.3       | 1.00‡ |            | 35.3              | 1.00‡ |            | 41.2             | 1.00‡ |             |
| Cartoons               | 73 | 57.5                              | 1.73  | 0.47, 6.36 | 21.9              | 1.08  | 0.28, 4.22 | 39.7       | 1.43  | 0.42, 4.84 | 39.7              | 1.08  | 0.31, 3.75 | 38.4             | 0.50  | 0.11, 2.21  |
| Time                   |    |                                   |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
| 12.00–14.00            | 26 | 46.2                              | 1.00‡ |            | 15.4              | 1.00‡ |            | 30.8       | 1.00‡ |            | 34.6              | 1.00‡ |            | 38.5             | 1.00‡ |             |
| 16.00–18.00            | 47 | 59.6                              | 1.52  | 0.45, 5.14 | 27.7              | 1.53  | 0.37, 6.26 | 42.6       | 1.14  | 0.34, 3.76 | 40.4              | 1.38  | 0.43, 4.44 | 36.2             | 1.05  | 0.31, 3.55  |
| 20.30–22.30            | 17 | 58.8                              | 2.23  | 0.56, 8.93 | 17.7              | 1.35  | 0.25, 7.25 | 41.2       | 1.84  | 0.49, 6.97 | 41.2              | 1.52  | 0.40, 5.78 | 47.1             | 1.84  | 0.45, 7.57  |
| Day of week            |    |                                   |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
| Mon–Fri                | 72 | 56.9                              | 1.00‡ |            | 23.6              | 1.00‡ |            | 40.3       | 1.00‡ |            | 41.7              | 1.00‡ |            | 40.3             | 1.00‡ |             |
| Weekend                | 18 | 50.0                              | 0.68  | 0.21, 2.21 | 16.7              | 0.71  | 0.17, 2.98 | 33.3       | 0.80  | 0.25, 2.56 | 27.8              | 0.43  | 0.13, 1.44 | 33.3             | 0.51  | 0.16, 1.68  |
| Food type†             |    |                                   |       |            |                   |       |            |            |       |            |                   |       |            |                  |       |             |
| Other than snacks      | 25 | 24.0                              | 1.00‡ |            | 12.0              | 1.00‡ |            | 24.0       | 1.00‡ |            | 12.0              | 1.00‡ |            | 0.0              | 1.00‡ |             |
| Sweet and salty snacks | 65 | 67.7                              | 9.21  | 2.82, 30.1 | 26.2              | 3.04  | 0.77, 12.0 | 44.6       | 3.00  | 1.01, 8.95 | 49.2              | 7.69  | 2.05, 28.8 | 53.9             | 59.4  | 3.47, 1016§ |

\*OR were estimated from multiple logistic regression models after adjustment for TV channel and food type. Estimates in bold type are significant at 0.05 level.

†'Other than snacks' category includes category 1 (oil and spreads), category 2 (fruit, vegetables and seeds), category 3 (meat-based products), category 4 (fishery products), category 5 (dairy products), category 7 (soups, composite dishes and sandwiches) and water; 'Sweet and salty snacks' include category 6 (cereal-based products), category 8 (fast food meals), category 9 (edible ices) and selected not categorised products (sugar-based products and coffee/tea).

‡Reference category.

§Crude OR, with 0.5 added to all cells, as there were some zero cells, causing problems with computation of the OR or its SE<sup>(39,40)</sup>.

Table 4 shows the distribution of food advertisements targeting children according to compliance with EU-PNC guidelines, overall and by nutrient components (see online supplementary material, Supplemental Table 8 shows the same by EU-PNC categories). Overall, 55.6% of the advertisements were not compliant: 22.2% for energy intake, 38.9% for Na, 38.9% for saturated fats and 38.9% for total sugars. Non-compliance with EU-PNC guidelines was more frequent among advertisements broadcast on Italia 1 compared with the Boing channel (OR: 4.21; 95% CI: 1.38, 12.9) and among those promoting snacks (OR: 9.21; 95% CI: 2.82, 30.1). No significant relationships were found for type of programme, time or day of the week.

## Discussion

According to our data, in Italy, more than 80% of TV food advertisements broadcast during children's programmes do not meet the independent WHO-ENPM guidelines. The majority were also not compliant with the EU-PNC, the European guidelines developed by leading food companies. More than 70% promoted sweet and salty snacks, of which none were compliant with WHO-ENPM.

Our data showing that advertisements during cartoons are more frequently non-compliant with the WHO-ENPM standards than fiction suggest that advertisements targeting younger children might be even less healthy than those aimed at older children.

In our data set, fruits and vegetables were never advertised during children's programmes and the majority of dietary products promoted were snacks, i.e. foods with high levels of energy intake (saturated) fats, salt and sugars. This is in broad agreement with previous studies<sup>(19,25,31,32)</sup>. Consequently, most products advertised did not satisfy overall compliance to international guidelines. In line with previous studies, we found similar results when comparing non-compliance rates according to WHO-ENPM<sup>(20,25)</sup> and EU-PNC<sup>(19,26,31)</sup>. As expected, there was a larger proportion of advertisements not compliant with the standards set by the WHO (WHO-ENPM) than those proposed by the EU-PNC. However, with the WHO-ENPM, we had more difficulty classifying selected food items in the various proposed categories. For example, we were not able to classify the McDonald's Happy Meal, given the lack of a specific category for meals in the WHO-ENPM. This highlights the need to update and revise independent international guidelines in order to clearly and comprehensively include all the possible food products.

In certain circumstances, our results contrast with reports prepared by the food industry<sup>(33)</sup>. For example, selected advertised meals failed to meet the EU-PNC standards. However, industry claimed to comply with the EU-PNC simply because the corresponding advertisement does not show any of the unhealthy food items that are actually found in the menu options<sup>(33)</sup>. This is a good

example of various attempts used by the industry to circumvent international guidelines. In fact, given that the advertisement emphasises the brand, rather than specific food components<sup>(34)</sup>, it is the advertised product that should be compliant with the guidelines and not the food items listed in the commercial spot. Indeed, some studies found that children could not recall healthy foods promoted in the advertisements for meals<sup>(35,36)</sup>.

The main limitation of the present study is the small sample of food advertisements promoted during children's programmes. In fact, 180 h of TV programmes recorded from the six most viewed Italian TV channels resulted in only ninety food advertisements targeting children, from two channels. However, even with such a limited sample, we were able to find significant findings due to the magnitude of non-compliant advertising comparing nutritional values with the standards proposed by two separate nutritional guidelines (WHO-ENPM and EU-PNC), overall and for each nutritional component (energy intake, saturated fats, total fats, total sugars and salt). In addition, our definition of advertisements targeting children may have some limitations since it refers to advertisements broadcast during children's programmes, and they might differ from advertisements broadcast during programmes really watched by children. In fact, the selection of advertisements targeting children may only vaguely identify all the commercials they frequently view, given that children frequently watch TV at certain times, regardless of the type of programme<sup>(37)</sup>. Thus, other studies focused on the so called 'peak viewing time of children' or on design elements with special appeal to children<sup>(24,37)</sup>. Hence, our restriction of considering targeting to children those advertisements that are broadcast during children's programmes (cartoons and fiction) assures a conservative analysis of advertising for an almost exclusive audience of children. This is an important different aspect from other content analyses on the issue that consider a potentially more or less mixed audience. Even with a narrow view on defining which advertisements are intended to reach children, the food industry fails to comply with their own regulation frameworks.

In conclusion, our results suggest that advertisements appearing on Italian TV channels promote unhealthy foods, boosting children's demand for non-core foods. All the advertisements for snacks and fast food meals, for instance, do not meet international guidelines. Moreover, as the WHO-ENPM guideline does not propose nutritional standards for all the food products, including meals, there is an urgent need to further define independent, easy-to-read, operative guidelines for food advertisements targeting children that should be enforced by all the TV channels. To our knowledge, in Italy, there is no legislation currently regulating the advertisements of food products to children. Only one TV channel dedicated to children belonging to the Italian public broadcasting company (i.e. Rai Yoyo) completely banned advertisements on the network since the 1 May 2016. In view of the attempts and loopholes used





by the food industry to circumvent international guidelines, our data support researchers' recommendations to ban<sup>(24,38)</sup> all TV advertisements on foods targeting children, not limited to those aired during children's programmes, but also including those appealing to children.

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### Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980020004693>

### References

- Collaborators GBDO, Afshin A, Forouzanfar MH *et al.* (2017) Health effects of overweight and obesity in 195 countries over 25 years. *N Engl J Med* **377**, 13–27.
- Swinburn BA, Sacks G, Hall KD *et al.* (2011) The global obesity pandemic: shaped by global drivers and local environments. *Lancet* **378**, 804–814.
- Ayer J, Charakida M, Deanfield JE *et al.* (2015) Lifetime risk: childhood obesity and cardiovascular risk. *Eur Heart J* **36**, 1371–1376.
- Biro FM & Wien M (2010) Childhood obesity and adult morbidities. *Am J Clin Nutr* **91**, 1499S–1505S.
- Whitaker RC, Wright JA, Pepe MS *et al.* (1997) Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med* **337**, 869–873.
- Reilly JJ & Wilson D (2006) ABC of obesity. Childhood obesity. *BMJ* **333**, 1207–1210.
- Luque V, Escribano J, Closa-Monasterolo R *et al.* (2018) Unhealthy dietary patterns established in infancy track to mid-childhood: the EU childhood obesity project. *J Nutr* **148**, 752–759.
- WHO (2004) Global Strategy on Diet, Physical Activity and Health. Geneva: World Health Organization; available at <http://www.who.int/dietphysicalactivity/strategy/eb11344/en/index.html> (accessed May 2004).
- Boyland EJ & Whalen R (2015) Food advertising to children and its effects on diet: review of recent prevalence and impact data. *Pediatr Diabetes* **16**, 331–337.
- Harris JL & Kalnova SS (2018) Food and beverage TV advertising to young children: measuring exposure and potential impact. *Appetite* **123**, 49–55.
- Lapierre MA, Fleming-Milici F, Rozendaal E *et al.* (2017) The effect of advertising on children and adolescents. *Pediatrics* **140**, S152–S156.
- Story M & French S (2004) Food advertising and marketing directed at children and adolescents in the US. *Int J Behav Nutr Phys Act* **1**, 3.
- WHO Regional Office for Europe (2013) Marketing of Foods High in Fat, Salt and Sugar to Children: Update 2012–2013. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0019/191125/e96859.pdf](http://www.euro.who.int/__data/assets/pdf_file/0019/191125/e96859.pdf) (accessed November 2020).
- Department of Health (2011) Nutrient Profiling Technical Guidance. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/216094/dh\\_123492.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/216094/dh_123492.pdf) (accessed November 2020).
- EU Pledge (2018) EU Pledge White Paper. [https://eu-pledge.eu/wp-content/uploads/EU\\_Pledge\\_Nutrition\\_White\\_Paper.pdf](https://eu-pledge.eu/wp-content/uploads/EU_Pledge_Nutrition_White_Paper.pdf) (accessed November 2020).
- WHO Regional Office for Europe (2015) Nutrient Profile Model. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0005/270716/Nutrient-children\\_web-new.pdf](http://www.euro.who.int/__data/assets/pdf_file/0005/270716/Nutrient-children_web-new.pdf) (accessed November 2020).
- Jensen JD & Ronit K (2015) The EU pledge for responsible marketing of food and beverages to children: implementation in food companies. *Eur J Clin Nutr* **69**, 896–901.
- Storcksdieck genannt Bonsmann S (2015) Comparison of the nutrient profiling schemes of the EU Pledge and the World Health Organization Regional Office for Europe. JRC Scientific and Technical Research Reports. 2015. Available online at: [https://publications.jrc.ec.europa.eu/repository/bitstream/JRC102763/np%20sf%20report%20\(online\)%20\(non-secured\).pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC102763/np%20sf%20report%20(online)%20(non-secured).pdf) (accessed November 2020).
- Missbach B, Weber A, Huber EM *et al.* (2015) Inverting the pyramid! Extent and quality of food advertised on Austrian television. *BMC Public Health* **15**, 910.
- Korosec Z & Pravst I (2016) Television food advertising to children in Slovenia: analyses using a large 12-month advertising dataset. *Int J Public Health* **61**, 1049–1057.
- Rincon-Gallardo Patino S, Tolentino-Mayo L, Flores Monterrubio EA *et al.* (2016) Nutritional quality of foods and non-alcoholic beverages advertised on Mexican television according to three nutrient profile models. *BMC Public Health* **16**, 733.
- Royo-Bordonada MA, Leon-Flandez K, Damian J *et al.* (2016) The extent and nature of food advertising to children on Spanish television in 2012 using an international food-based coding system and the UK nutrient profiling model. *Public Health* **137**, 88–94.
- Menger-Ogle AD, Johnson AN, Morgan JA *et al.* (2018) Television advertising of food during children's programming in Nepal. *Nutrition* **55–56**, 41–44.
- Effertz T & Wilcke AC (2012) Do television food commercials target children in Germany? *Public Health Nutr* **15**, 1466–1473.
- Nasreddine L, Taktouk M, Dabbous M *et al.* (2019) The extent, nature, and nutritional quality of foods advertised to children in Lebanon: the first study to use the WHO nutrient profile model for the Eastern Mediterranean Region. *Food Nutr Res*. Published online: 19 February 2019. doi: 10.29219/fnr.v63.1604.
- Brinsden H & Lobstein T (2013) Comparison of nutrient profiling schemes for restricting the marketing of food and drink to children. *Pediatr Obes* **8**, 325–337.



27. Jenkin G, Wilson N & Hermanson N (2009) Identifying 'unhealthy' food advertising on television: a case study applying the UK Nutrient Profile model. *Public Health Nutr* **12**, 614–623.
28. Scarborough P, Payne C, Agu CG *et al.* (2013) How important is the choice of the nutrient profile model used to regulate broadcast advertising of foods to children? A comparison using a targeted data set. *Eur J Clin Nutr* **67**, 815–820.
29. EU Pledge (2017) EU Pledge: monitoring Report 2017. [https://eu-pledge.eu/wp-content/uploads/EU\\_Pledge\\_2017\\_Monitoring\\_Report.pdf](https://eu-pledge.eu/wp-content/uploads/EU_Pledge_2017_Monitoring_Report.pdf) (accessed November 2020).
30. Cauchi D, Reiff S, Knai C *et al.* (2017) Television food advertising to children in Malta. *Health Promot Int* **32**, 419–429.
31. Keller SK & Schulz PJ (2011) Distorted food pyramid in kids programmes: a content analysis of television advertising watched in Switzerland. *Eur J Public Health* **21**, 300–305.
32. Adams J, Tyrrell R, Adamson AJ *et al.* (2012) Effect of restrictions on television food advertising to children on exposure to advertisements for 'less healthy' foods: repeat cross-sectional study. *PLoS One* **7**, e31578.
33. McDonald's (2011) The EU Pledge McDonald's Commitment. [https://eu-pledge.eu/wp-content/uploads/EU\\_Pledge\\_McDonalds\\_Commitment.pdf](https://eu-pledge.eu/wp-content/uploads/EU_Pledge_McDonalds_Commitment.pdf) (accessed July 2020).
34. Bernhardt AM, Wilking C, Adachi-Mejia AM *et al.* (2013) How television fast food marketing aimed at children compares with adult advertisements. *PLoS One* **8**, e72479.
35. Bernhardt AM, Wilking C, Gilbert-Diamond D *et al.* (2015) Children's recall of fast food television advertising – testing the adequacy of food marketing regulation. *PLoS One* **10**, e0119300.
36. Bernhardt AM, Wilking C, Gottlieb M *et al.* (2014) Children's reaction to depictions of healthy foods in fast-food television advertisements. *JAMA Pediatr* **168**, 422–426.
37. Kelly B, Halford JC, Boyland EJ *et al.* (2010) Television food advertising to children: a global perspective. *Am J Public Health* **100**, 1730–1736.
38. Vandevijvere S, Soupen A & Swinburn B (2017) Unhealthy food advertising directed to children on New Zealand television: extent, nature, impact and policy implications. *Public Health Nutr* **20**, 3029–3040.
39. Deeks JJ & Higgins JPT (2010) Statistical algorithms in Review Manager 5. [https://www.researchgate.net/publication/241313811\\_Standard\\_statistical\\_algorithms\\_in\\_Cochrane\\_reviews\\_Ve\\_r\\_s\\_i\\_o\\_n\\_5](https://www.researchgate.net/publication/241313811_Standard_statistical_algorithms_in_Cochrane_reviews_Ve_r_s_i_o_n_5) (accessed January 2005).
40. Pagano M & Gauvreau K (2000) *Principles of Biostatistics*, 2nd ed. Boca Raton, FL: CRC Press.