GRADUATION PROJECT

Degree in Dentistry

EVALUATION OF FOOD ADVERTISING ON TELEVISION AND ITS RELATIONSHIP WITH CARIES PREVALENCE IN THE PAEDIATRIC POPULATION

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ABSTRACT

Introduction: Dental caries remains one of the most common chronic diseases in children worldwide. Among the many factors influencing its development, poor dietary habits, particularly the frequent consumption of sugary and ultra-processed foods, play a central role. Television continues to be a major influence, especially among young audiences, where advertising often promotes foods contributing to dental caries.

Objectives: To compare television food advertisements in France and Spain by analyzing the frequency and timing of cariogenic food ads, the marketing techniques used to target children, and their potential impact on children's eating habits, while assessing the associated risk of dental caries.

Methods: Six television channels were selected: three from France (TF1, France 2, Gulli) and three from Spain (Antena 3, La 1, Clan TVE), including two generalist and one children's channel per country. Advertisements were recorded weekly and analyzed by categorizing food products based on their cariogenic potential, noting the presence of children, the marketing techniques used, and the time slots of broadcast.

Results: A total of 1,263 advertisements were recorded, including 371 food-related ads. The highest frequency of cariogenic food ads appeared on children's channels, notably Gulli and Clan TVE. Fast food, chocolate, and sweetened cereals were the most promoted products. Midday and evening slots showed the greatest concentration of food advertisements. In both countries, techniques such as animation, jingles, and the use of children's characters were frequently employed.

Conclusion: Television promotion of cariogenic foods remains a major contributor to unhealthy diets and is linked to a higher prevalence of dental caries in children.

KEYWORDS :
Dentistry, Television advertising, Dental caries, France, Spain

RESUMEN

Introducción: La caries dental sigue siendo una de las enfermedades crónicas más comunes en niños a nivel mundial. Entre los factores que influyen en su aparición, los hábitos alimentarios poco saludables, especialmente el consumo frecuente de alimentos azucarados y ultraprocesados, juegan un papel central. La televisión sigue siendo una fuente importante de influencia, especialmente entre los más jóvenes, donde la publicidad suele promover productos que contribuyen al desarrollo de caries.

Objetivos: Comparar la publicidad televisiva de alimentos en Francia y España, analizando la frecuencia y horarios de emisión de anuncios de productos cariogénicos, las técnicas de marketing utilizadas para atraer a los niños y su posible influencia en los hábitos alimentarios, evaluando el riesgo de caries.

Metodología: Se seleccionaron seis canales: tres franceses (TF1, France 2 y Gulli) y tres españoles (Antena 3, La 1 y Clan TVE), incluyendo dos generalistas y uno infantil por país. Los anuncios fueron grabados semanalmente y analizados, clasificando los productos según su potencial cariogénico, evaluando la presencia de niños, técnicas de atracción infantil y franjas horarias.

Resultados: Se analizaron 1.263 anuncios, de los cuales 371 eran alimentarios. La mayor frecuencia de anuncios de alimentos cariogénicos se registró en Gulli y Clan TVE. Los productos más promocionados fueron comida rápida, chocolate y cereales azucarados. Los anuncios se concentraron en horarios de mediodía y noche. Técnicas como animaciones, jingles y personajes infantiles fueron comunes en ambos países.

Conclusiones: La publicidad televisiva de alimentos cariogénicos está asociada a una mayor prevalencia de caries en la población infantil.

PALABRAS CLAVE

Odontologia, Publicidad televisiva, Caries dental, Francia, España

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1. INTRODUCTION

1.1 The importance of a healthy diet

A healthy diet is essential for maintaining overall well-being and preventing disease. The nutrients we get from food support important bodily functions, including metabolism, immune defense, and cell regeneration (1). People who consume balanced diets rich in fruits, vegetables, whole grains, and lean proteins generally enjoy better health, improved brain function, and a lower risk of developing chronic illnesses (1,2).
But diet doesn't just affect physical health, it also plays a key role in mental well-being. The gut microbiome, which helps with digestion and immune response, is strongly influenced by what we eat (2). A diet full of fiber, probiotics, and essential nutrients helps maintain a healthy gut microbiota, which has been linked to better mood stability and a lower risk of anxiety and depression (2). On the other hand, diets high in processed foods, sugar, and unhealthy fats can disrupt the gut microbiome, leading to inflammation and negative effects on brain function (2,3).

Among chronic diseases, cardiovascular conditions remain the leading cause of death worldwide, and dietary choices play a crucial role in their prevention (4). Diets high in saturated fats, trans fats, and sodium increase the risk of high blood pressure, atherosclerosis, strokes, heart attacks, and type 2 diabetes (4). However, adopting a heart-healthy diet rich in omega-3 fatty acids, fiber, and antioxidants has been shown to significantly reduce cardiovascular risks (2, 4).

Over the past few decades, dietary habits have changed dramatically due to globalization and changes in food production. This shift is particularly noticeable among younger generations, who are constantly exposed to new dietary trends through social media and advertising (2,5). Traditional diets, once focused on fresh, natural ingredients, have been replaced by ultra-processed foods that are high in sugar, unhealthy fats, artificial additives, and preservatives (2,5).

1.2 Diet and oral health: the link to dental caries

Eating habits established in childhood can have long-term effects, increasing the risk of chronic diseases and influencing oral health (2). Early exposure to highly processed foods reinforces a preference for sugary, fatty, and processed products, which complicates the establishment of healthy dietary patterns (2,5,6). While the impact of diet on systemic health is well recognized, its role in oral diseases is equally important (7).

Among these, dental caries remains one of the most widespread conditions, closely associated with frequent sugar consumption (8,9). Dental caries is a complex, multifactorial disease involving interactions between cariogenic bacteria, fermentable carbohydrates, susceptible tooth surfaces, and time (9,10). Acidogenic bacteria like *Streptococcus mutans* and *Lactobacillus* species metabolize sugars within dental biofilm, producing acids that lower pH levels below the critical threshold of 5.5, leading to enamel demineralization and lesion progression if the process remains uninterrupted (9,10).

The caries process is not linear, it involves alternating cycles of demineralization and remineralization. In its initial stages, the loss of mineral content in enamel can be reversed with the help of saliva, fluoride, and proper oral hygiene. However, when the demineralization process remains uninterrupted, the continuous loss of mineral content eventually leads to irreversible structural breakdown of the enamel (11). Caries can affect both primary and permanent dentitions and has been documented for thousands of years. Historically, its prevalence significantly increased with changes in dietary habits, particularly the rise in consumption of refined sugars during industrialization (5,11).

In public health, the term *prevalence* refers to the proportion of a population affected by a specific disease at a given time. This indicator helps to evaluate disease burden and prioritize preventive strategies (11,12). Prevalence of dental caries is particularly high in regions with limited access to fluoride, oral health education, and dental services, highlighting the importance of social and environmental determinants (12).

In 2017, the Global Burden of Disease Study confirmed that untreated dental caries in permanent teeth was the most common health condition globally, with more than 2.5 billion individuals affected. Caries in primary teeth was also a major concern, impacting over 530 million children worldwide (13). According to global health estimates, the highest burden is observed in countries from Latin America, South Asia, and the Middle East, where preventive and restorative care remains limited (12,13).

In pediatric dentistry, a more severe form of dental caries, known as Early Childhood Caries (ECC), is frequently observed (9,14). ECC is defined as the presence of at least one decayed, missing (due to caries), or filled surface in any primary tooth in a child under six years of age (14). It typically affects the upper anterior teeth and can progress rapidly, particularly when risk factors such as frequent sugar intake, poor oral hygiene, and early bacterial transmission are present (9,14). Beyond the dental implications, ECC can impair nutrition, sleep, speech development, and overall quality of life (14).

Unlike genetic conditions, diet is a modifiable risk factor, meaning that changing eating habits can significantly improve both overall and oral health (15). However, food choices are influenced by more than just personal preference they are shaped by economic, social, and cultural factors. In many cases, processed and fast foods are cheaper and more readily available, making them the default option for disadvantaged communities (5,15).

1.3 Advertising and its influence on children's eating habits

Television remains one of the most influential platforms for food advertising, particularly targeting children (5,6,16,17). Advertisers use bright colors, animated characters, jingles, and entertaining storylines to capture children's attention and influence their food preferences (17,18,19). Children, who lack the ability to critically evaluate advertising, are especially vulnerable to these persuasive messages (18). Studies show that over 70% of food ads directed at children promote foods high in sugar, fat, and additives, normalizing unhealthy dietary habits (5,6,19). Over time, this constant exposure leads to increased sugar consumption and a higher risk of health problems, including dental caries (20,21).

Advertising also builds strong brand loyalty from an early age. Children who see frequent ads for a particular brand develop positive associations with it and are more likely to request, purchase, and consume those products (9,21). This effect, known as "pester power", puts pressure on parents to buy unhealthy food items, reinforcing poor dietary patterns that can lead to obesity and other health complications (6,9).

But it doesn't stop at television, food brands now extend their influence through digital marketing. Many TV commercials direct children to websites, social media platforms, and mobile apps, further engaging them with unhealthy food brands (22). This multi- platform exposure makes it harder for parents to monitor their children's advertising consumption and food choices (22, 23).

The WHO recommends that children's sugar intake should be limited to no more than 10% of their daily energy consumption (24). However, children who are regularly exposed to high-sugar food advertisements tend to consume significantly more sugar than recommended, increasing their risk of dental caries and other health issues (24, 25).

A systematic review from Cambridge University confirmed that children with high exposure to ultra-processed foods and sugary drinks are far more likely to develop cavities (26). Additionally, ads for sugary cereals, soft drinks, and candy directly influence children's snack preferences, making them choose cariogenic foods more often (27,28). Since most food ads fail to mention health risks, sugary foods continue to be perceived as fun, rewarding, and essential for happiness, reinforcing unhealthy dietary habits (28,29).

1.4 Food advertising regulation in France and Spain

Although France and Spain are neighboring countries, their approaches to food advertising regulation differ (30). In France, the ARCOM authority oversees food advertisements directed at children, ensuring compliance with rules promoting healthy habits and requiring health warnings (31). The Nutri-Score system was also implemented to help consumers easily assess food nutritional quality (32). In Spain, although the Nutri-Score has been adopted, food marketing regulation mainly relies on the PAOS Code, a self-regulatory framework designed in 2005 to limit marketing practices toward children under 12 (32,33).

1.5 Justification

Children's eating habits are deeply influenced by their environment, and advertising is one of the strongest forces shaping their food preferences. In recent years, the constant promotion of sugary and highly processed foods has led many children to move away from healthier choices like fruits and vegetables. While it is widely recognized that advertising affects what children want to eat, its impact on oral health, more particularly on dental caries, is less often discussed. Comparing how food advertising works in countries like France and Spain can help us better understand how children's diets, and in turn their dental health, are shaped. This study explores these differences to offer helpful insights that could lead to better strategies for protecting children's health.

2. OBJECTIVE

To compare television food advertisements in France and Spain by analyzing the frequency and timing of advertisements promoting cariogenic foods, the marketing techniques used to target children, and their potential influence on children's dietary habits, while assessing the associated risk of dental caries development.

3. MATERIAL AND METHODS

This study will take an empirical approach to analyze television advertisements targeting children in France and Spain.

The analysis focuses on advertisements aired during children's programming and general television content to compare marketing strategies and regulatory influences between the two countries.

The study was reviewed and validated by the Investigation Committee of the European University of Madrid with the code: OD.067/2425.

- Period of sampling:

Ads will be recorded in February and March in Spain and France. Recordings will include the weeks, weekends, and school holidays.

It will be divided by weeks: from the 10th to the 16th of February, from the 17th to the 23rd of February, from the 24th to the 2nd of March and finally from the 3rd to the 9th of March.

- Targeted channels:

To have a representative sample, 3 television channels were selected from each country.

In France:

- **TF1**: the most watched private channel in France.
- **France 2**: a national public channel.
- **Gulli**: children's channel.

In Spain:

- **Antena 3**: private channel in Spain with high audience reach.
- **La 1**: the primary public channel.
- **Clan TVE**: children's channel.

- Time:

Ads will be recorded during morning (7h-9h30), midday (12h-14h30) and evening times (19h-22h).

Special focus will be on peak viewing times for children, like Saturday and Sunday mornings and after-school hours.

- Ad content categorization:

Types of products: ads will be sorted into categories like sugary snacks, fast foods, drinks, cereals, and healthier options.

Marketing strategies: techniques used in the ads will be noted, such as emotional messages, visual elements (cartoons, bright colors, ...), special offers (free toys or collectible items,…).

Advertisements will also be classified based on the presence of children, considering their age group (0-5, 6-10, 11-15 y.o) and gender distribution (boy: girl ratio), depending on the country and channel.

- Frequency and repetition:

The total number of food ads shown per hour will be counted for both countries.

Ads that are repeated often will be evaluated to see which products or brands target children the most.

- Comparison between Spain and France:

Advertising rules: differences in the laws about food advertising to children in Spain and France will be reviewed to see how they affect the ads.

4.RESULTS

A total of 1162 advertisements were analyzed with a total duration of 7h40min (table 1).

Table 1: *Number of advertisements evaluated for each country.*

Characteristics	Number of analyzed ads (N)	Duration (h)
Tv channels		
TF1	208	1h47
France 2	143	1h03
Gulli	215	1h52
Antena 3	260	2h07
La 1	172	1h22
Clan TVE	265	1h58
Analyzed month		
February	712	4h38
March	450	3h02
Weekly periods		
Weekdays	682	4h21
Weekends	342	2h13
Food advertisements	371	2h27

Most advertisements came from private channels (Antena 3, TF1), while public channels (France 2, La 1) had fewer.
Children's channels (Gulli, Clan TVE) accounted for a significant part.
Overall, food ads made up 34% of total advertisments (371).

Table 2: *Proportion of food advertisements by TV channel in France and Spain.*

Country	Channel	Number of ads (N)	Food ads (N)	Food ads (%)
FRANCE	Tf1	208	67	32,2%
FRANCE	France 2	143	41	27,7%
FRANCE	Gulli	215	102	47,4%
SPAIN	Antena 3	260	97	37,3%
SPAIN	La 1	172	52	30,2%
SPAIN	Clan TVE	265	135	50,9%

In France, the highest proportion of food ads was observed on Gulli (47.4%)**,** a children's channel, while TF1 and France 2 had lower proportions (32.2% and 28.7%**,** respectively). In Spain, food advertisements were most frequent on Clan TVE (50.9%), another children's channel, followed by Antena 3 (37.3%) and La 1 (30.2%).

Figure 1: *Distribution of advertisements by categories on television in France.*

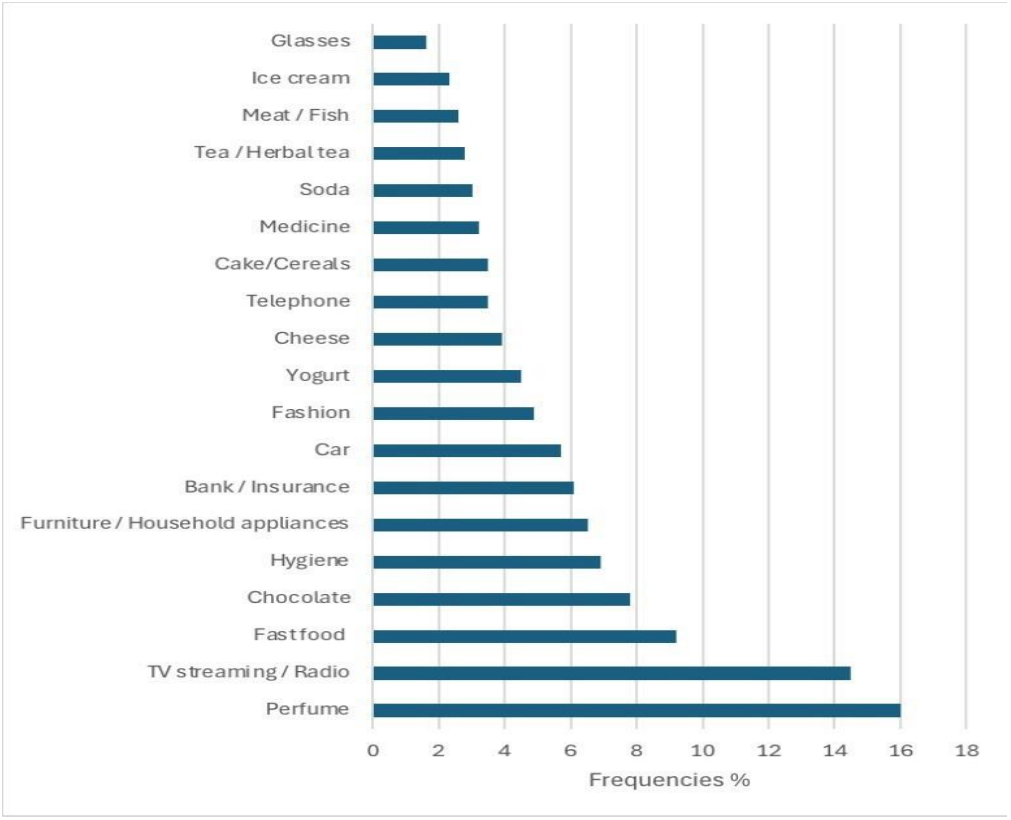
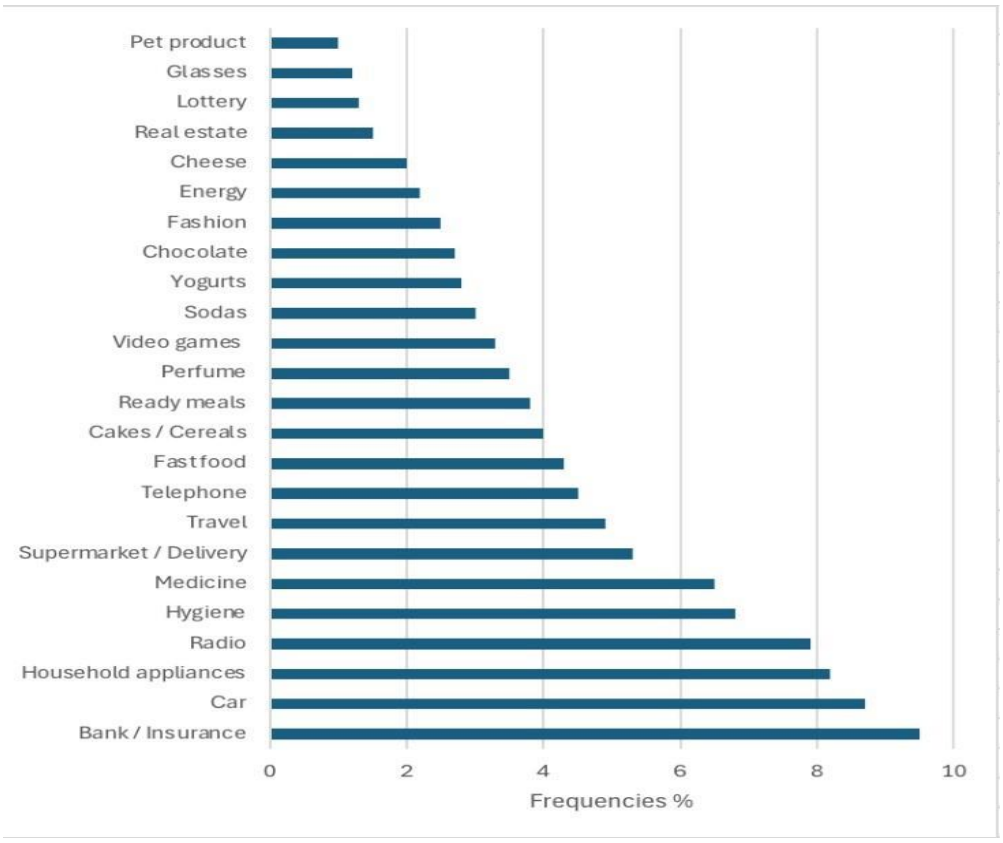


Figure 2: *Distribution of advertisements by categories on television in Spain.*



In both countries, non-food ads (perfumes, banking, appliances) were most frequent, but many promoted cariogenic foods. In France, fast food (5.9%), chocolate (6.3%), and cake/cereals (4.8%) dominated (figure 1). In Spain, fast food (6.8%), chocolate (6.1%), and sugary cereals (5.7%) were common, with more sugary beverages than in France (figure 2).

Table 4: *Percentage of advertised cariogenic food on television in France.*

Type of cariogenic items	Number of ads (n)	Percentage (%)
Fast food	65	30,9%
Chocolate	53	25,2%
Sweetened yogurt	29	13,8%
Cakes/Cereals	24	11,4%
Soda/Fruit drinks	20	9,5%
Ice cream	16	7,6%
Other food ads	3	1,4%

Table 5: *Percentage of advertised cariogenic food on television in Spain.*

Type of cariogenic items	Number of ads (n)	Percentage (%)
Fast food	72	25,4%
Cakes/Cereals	70	24,6%
Soda/Fruit drinks	47	16,5%
Sweetened yogurt	43	15,1%
Chocolate	41	14,4%
Ice cream	7	2,5%
Other food ads	4	1,4%

In both France and Spain, fast food emerged as the most advertised cariogenic food category on television.

However, while France showed a preference for chocolate (25.2%) and sweetened yogurt (13.8%) as the second and third most advertised products, Spain was characterized by a higher proportion of high sugar snacks (cakes and cereals (24.6%) and soda or fruit drinks (16.5%).

Figure 3*: Distribution of food advertisements by time slots in France.*

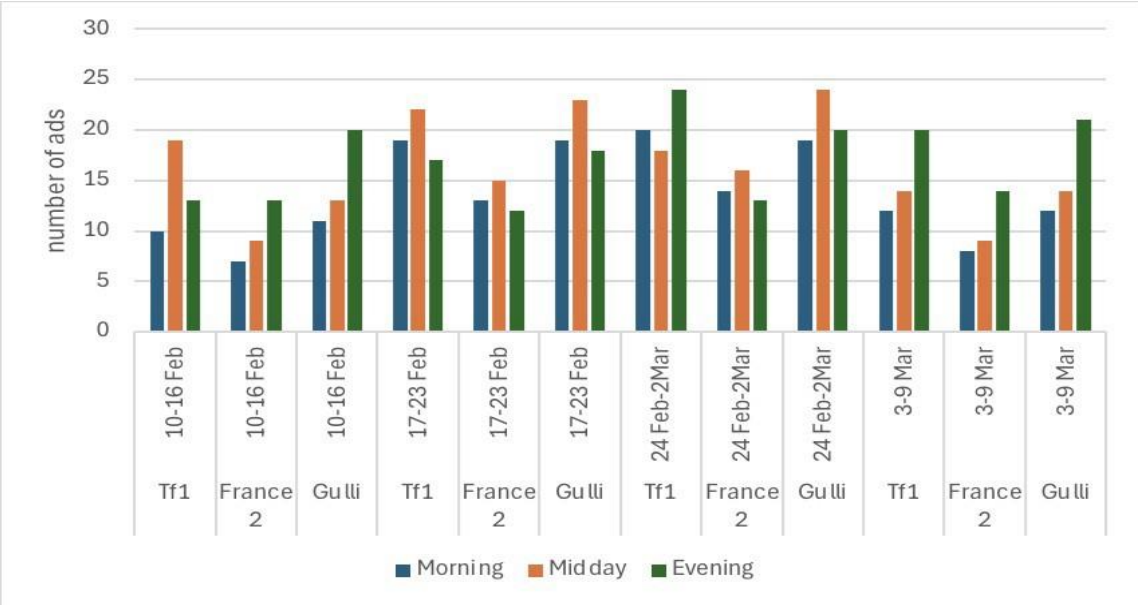
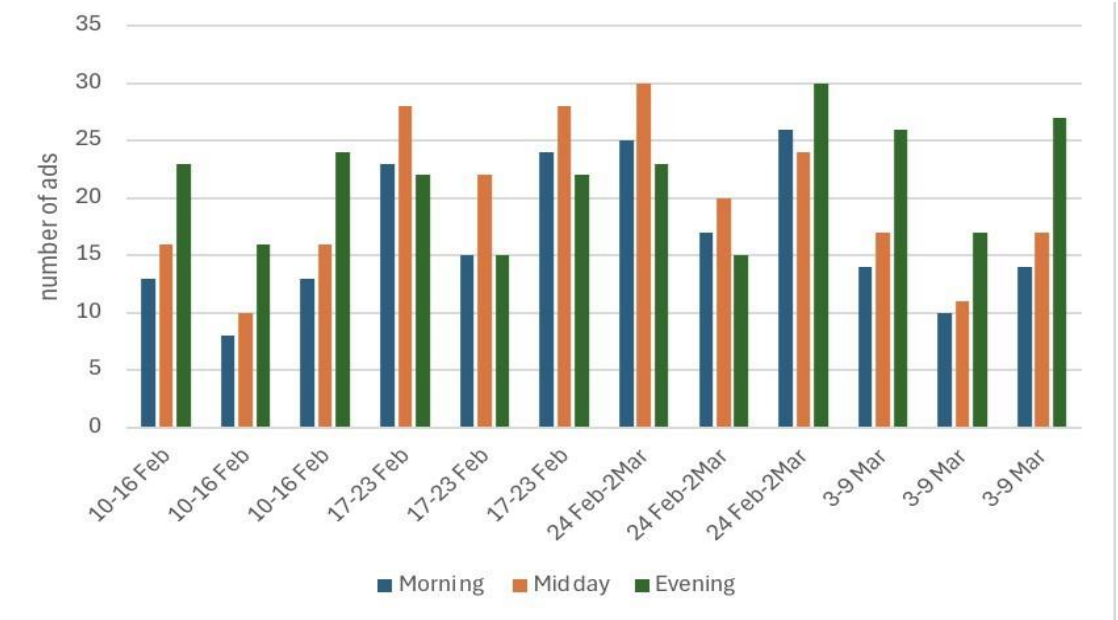


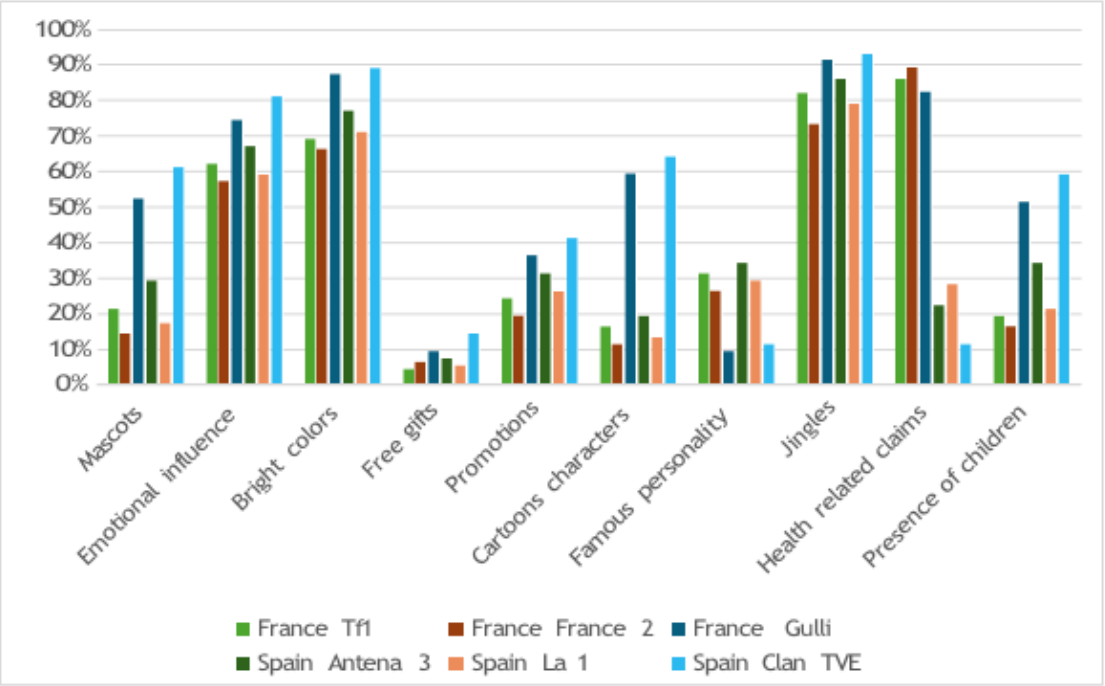
Figure 4: *Distribution of food advertisements by time slots in Spain.*



The frequency of food advertisements varies depending on the time of day and week. Overall, the number of food advertisements varies across the four weeks and time slots in both France and Spain.

In both countries, advertising was present during the morning, midday, and evening periods, with some weekly fluctuations. A slight increase in the total number of ads can be observed during the 2nd and 3rd weeks of February.

Figure 5: *Evaluation of the marketing techniques in television in France and Spain.*



Food advertisements in France and Spain use many strategies to attract attention. The most common are bright colors, emotional influence, and jingles. These are especially high on children's channels like Gulli in France and Clan TVE in Spain (Figure 7). Cartoon characters and mascots are used in more than 50% of food advertisements in Gulli and Clan TVE. In contrary, promotions and free gifts (less than 10%, except for Clan TVE) appear less often (Figure 5).

Table 6: *Children's presence in advertisements by age group*.

Tv channel	Presence of children (%)	0-5 y.o (%)	6-10 y.o (%)	11-15 y.o (%)	Gender ratio (boy: girl)
TF1	19%	32%	45%	23%	48:52
France 2	16%	35%	40%	25%	55:45
Gulli	51%	48%	35%	17%	59:41
Antena 3	34%	34%	48%	18%	58:42
La 1	21%	41%	39%	20%	51:49
Clan TVE	59%	45%	40%	15%	66:34

The presence of children in food advertisements varied across channels and countries. Children's TV channels like Gulli and Clan TVE had the highest percentage of ads featuring children (51% and 59%, respectively). On generalist channels such as TF1 and Antena 3, children were present in fewer ads (32% and 34%), with a higher proportion of older children (6-10 years). Gender representation was relatively balanced across most channels, although more boys were present in ads on children's networks (Table 6).

Given the strong influence of advertising on children's diets, examining the prevalence of dental caries in France and Spain is key to understanding the broader health impact of these marketing strategies.

Table 7: *Caries prevalence in France and in Spain.*

Country	Year, Author	Study characteristics	Prevalence of caries %
France	HAS-(2010) (34).	Around 7,000 children (national data and school health screenings).	- Children 6 y.o: 42%. -Children 12 y.o: 35%-45%.
France	DREES – (2013) (35).	Multiple national data Sources.	- Children 6 y.o: 10% (from managerial background) / 30% (from working-class).
France	ARS Île-de-France – (2022) (36).	Thousands of children from Île de France region.	Children from 8 to 10 y.o: 32% In ZUS (urban sensitive areas): 44,7%
France	Hescot P et al. (2006) (37)	National study evaluating the oral health status (children aged 6 and 12 years).	At 6 years: 45% had caries in primary teeth. At 12 years: 43% had caries in permanent teeth.
France	Traver et al. (2014) (38)	Children participating in the national dental check-up program (EBD).	41% of children had at least one untreated carious lesion.
France	Droz et al. (2006) (39)	Epidemiological study on 4-year-old children enrolled in French preschools.	43% of children had at least one carious lesion.

Spain	Kazeminia et al. (2020) (40)	Review of studies published between 1995-2019.	Children from 6 to 10 y.o: 47,2%. Children 12 y.o: 25,5% Children 15 y.o: 26,2%
Spain	Almerich-Torres et al. (2020). (41)	A cross-sectional survey with 1722 children aged between 6 and 15 y.o.	At age 6: 37.4%. At age 12: 30.1%. At age 15: 44.6%.
Spain	Consejo General de Dentistas (2022) (42)	National survey on dental health status; focus on primary teeth.	Children under 6 y.o: 35%.
Spain	Consejo General de Dentistas (2022) (42)	National survey on dental health status; focus on permanent teeth	Children aged 11–17 y.o: 30-35%
Spain	Montero et al. (2015) (43)	Cross-sectional study conducted in Granada among 829 schoolchildren aged 6–12 years.	Children from 6 to 12 y.o: 32.3%.

When comparing the results from different reviews and research studies, it appears that the prevalence of dental caries varies widely, depending on the sample size and the location of each study. In France, caries prevalence among children shows important variations, ranging from around 10% among privileged groups to over 40% among disadvantaged populations. National surveys report prevalence rates of 35% to 45% among 12-year-olds and approximately 4 2 % among 6-year-olds. In Spain, between 30% and 50% of children are affected depending on their age and the region studied. Younger children (around 6 years old) tend to show higher prevalence rates, while a slight decrease is seen among adolescent.

5. DISCUSSION

This study analyzed 1,263 advertisements, including 371 food-related ads, revealing how television advertising influences children's eating habits and oral health. Comparing France and Spain shows both similarities and some notable differences.

Although various non-food products were advertised, food advertisements constituted a significant portion of children's exposure. In France, non-food ads often promoted perfumes, hygiene products, and TV streaming services, whereas in Spain, banking, insurance, and household appliances were more common. Despite this, food advertising remained highly prevalent during children's programming. These findings align with Boyland et al. (2016), who observed that food products dominate children's exposure during key viewing periods (20). Similarly, Sadeghirad et al. (2016) highlighted that unhealthy food marketing has a stronger and more lasting influence on children's eating behaviors compared to non-food advertising (44).

The proportion of food advertisements varied across the analyzed channels. In France, food-related ads accounted for 32.2% on TF1, 28.7% on France 2, and 47.4% on Gulli. In Spain, the percentages were higher : 37.3% on Antena 3, 30.2% on La 1, and 50.9% on Clan TVE. Children's channels in both countries had the highest rates, with Clan TVE slightly surpassing Gulli. These findings suggest greater exposure to food marketing among Spanish children. This trend aligns with Lobstein et al. (2004), who reported that food advertising targeting children typically promotes sugary and fatty products over healthier alternatives (21). Baker et al. (2020) similarly noted that the rise of ultra-processed food marketing has contributed significantly to the global spread of unhealthy dietary habits (4).

When analyzing the specific categories of advertised food products, some differences between the two countries emerged. In France, fast food made up 30.9% of cariogenic food ads, followed by chocolate at 25.2%, sweetened yogurts at 13.8%, and cakes/cereals at 11.4%. In Spain, fast food (25.4%) remained the most advertised category, but cakes/cereals (24.6%), sodas/fruit juices (16.5%), and sweetened yogurts (15.1%) were more evenly distributed.

Thus, while French advertising concentrated heavily on a few high-sugar categories, Spanish advertising exposed children to a broader range of sugary foods, potentially compounding the risk. Kelly et al. (2019) found that cumulative exposure to multiple categories of unhealthy foods can intensify children's poor eating habits (49), a concern also highlighted by the WHO (29).
The fact that sugary foods dominate in advertising also reflects broader industry priorities, where big food companies keep pushing high-profit, ultra-processed items despite their negative health impacts (4, 17).

Looking at the broadcast timing of these ads, we found a clear spike in food advertisements during midday and evening hours when children are most likely to be at home after school or during lunch breaks. In France, food advertisements were distributed relatively evenly between midday (35%), evening (36%), and morning slots (29%). In Spain, however, food advertising was more concentrated during midday (40%) and evening (38%), with less exposure in the morning (22%). This was particularly visible in February. It coincided with school holidays in both countries: Zone C in France (February 10th – 26th) and Andalusia and Madrid in Spain (February 17th – 26th). As shown in several studies, advertising exposure increases during vacation periods due to higher screen time (13,14). Gatou et al. (2023) explained that even short bursts of increased exposure can significantly influence children's food choices, especially when it involves sugary products (46).

When it comes to the marketing techniques used in these ads, both countries made extensive use of emotional strategies. In France, 85% of food ads used jingles, 82% bright colors, and 60% mascots, whereas in Spain, the proportions were slightly higher with 88% using jingles, 86% bright visuals, and 70% mascots. Promotions and free gifts, however, were less frequent in both countries (about 10% of ads).
Studies by Connor et al. (2006) and Cairns et al. (2013) show that emotional techniques shape children's attitudes and brand recognition (16,17). Instead of judging nutrition, children instinctively respond to humor, fantasy, or adventure, making them desire products without critical evaluation (17).
Animated characters and mascots, which children often find relatable and trustworthy, amplify the persuasive power of the ads. Similarly, Gatou et al. (2023) found that these emotionally charged techniques could easily override children's natural resistance to advertisements, embedding preferences for high-sugar foods at an early age (46).

Another important point is the higher presence of male characters : 66% on Clan TVE, 60% on Gulli. In France, the 6–10 age group dominated (except on Gulli), while in Spain, 0–5-year-olds were more frequent on Clan TVE and La 1.
Kelly et al. (2019) found male protagonists appeared twice as often as females in food ads. Boys were shown in dynamic roles (sports, adventure), girls in passive roles (49). This imbalance reinforces stereotypes, shaping food behaviors and self-identification.
Additionally, Kelly et al. (2019) emphasized that children tend to identify more strongly with characters of the same gender, meaning that the overrepresentation of boys could have a disproportionate influence on boys' brand preferences and food choices (49).

Comparing private and public channels shows a similar pattern. In France, food ads were 32.2% on TF1 (private) vs 28.7% on France 2 (public) ; in Spain, 37.3% on Antena 3 (private) vs 30.2% on La 1 (public).
Private channels aired more frequent and aggressive advertising of sugary products than public channels. This could be due to stricter rules in publicly funded media. León-Flández et al. (2017) observed that Spanish public channels follow nutritional advertising codes like the PAOS Code more strictly than private channels (33). However, even on public channels like Clan TVE, there was still a high volume of cariogenic food ads, demonstrating the challenges of relying solely on self-regulation. In France, stronger oversight, including the Nutri-Score system, helped maintain more balance in food advertisements (31, 32).
National regulation differences were clear. France's Nutri-Score system and ARCOM enforcement ensured structured oversight (31,32), while Spain relied on the criticized PAOS code with weaker enforcement (33).

These differences could explain why food ads in Spain were more frequent and often promoted less nutritious products. Comparative research has shown that countries with stricter regulations, such as Chile and the UK, have seen reductions in children's exposure to unhealthy food ads, which might be a model for future improvements in Spain (53, 33).

The strong presence of cariogenic food advertisements during peak viewing times raises serious concerns regarding children's oral health. Dental caries remains the most common chronic disease among children worldwide, with its global prevalence closely linked to excessive sugar consumption (10). This association is particularly worrying given the persistent high rates of caries observed in both Spain and France.

In France, several national and regional studies have documented the significant prevalence of dental caries among children. According to the French National Authority for Health (HAS), around 42% of 6-year-olds and between 35% and 45% of 12-year-olds are affected (34). The DREES (Directorate for Research, Studies, Evaluation and Statistics) reported that only 10% of children from managerial backgrounds had caries, compared to 30% among working-class families (35). In the Île-de-France region, ARS found that 32% of children aged 8 to 10 had caries, rising to 44.7% in disadvantaged urban areas (36). National studies by Hescot et al. (2006) confirmed this trend, observing that 45% of 6-year-olds had caries in primary dentition, and 43% of 12-year-olds in permanent teeth (37). Further research by Traver et al. (2014) found that 41% of children had at least one untreated carious lesion (38), while Droz et al. (2006) reported a 43% prevalence among 4-year-olds (39).

In Spain, several studies also show high caries rates. According to Kazeminia et al. (2020), who conducted a systematic review and meta-analysis of national data, the prevalence of dental caries in Spain was estimated at 47.2% among children aged 6 to 10, 25.5% at age 12, and 26.2% at age 15 (40). These results were supported by the study from Almerich-Torres et al. (2020), which found a prevalence of 37.4% at age 6, 30.1% at age 12, and 44.6% at age 15 in the Valencia region (41). National data from the “Consejo General de Dentistas” (42) indicated that 35% of children under 6 and 30–35% of adolescents aged 11 to 17 were affected. In the city of Granada, Montero et al. (2015) reported a 32.3% prevalence among schoolchildren aged 6 to 12 (43).

Altogether, these findings confirm that both France and Spain face a significant pediatric dental caries burden, with higher prevalence in younger age groups and disadvantaged communities. The consistent results across regional and national studies highlight the need for targeted public health strategies in both countries.
These figures reflect not only a public health challenge but also the long-lasting impact of early dietary behaviors shaped by external influences such as television advertising.
The well-established link between frequent sugar intake and dental caries, mediated by acidogenic bacterial activity, highlights the importance of limiting children’s exposure to sugary foods (18). In this context, the repeated exposure to sugary food advertisements does not merely encourage unhealthy eating habits; it reinforces biological pathways favoring early onset dental caries.

Importantly, the role of media exposure goes beyond simple dietary encouragement. Shqair et al. (2019) demonstrated a strong association between extended screen time

and higher consumption of sugary foods, highlighting that repeated exposure to emotionally engaging food advertisements compounds the risk (52). Children exposed more frequently to these persuasive messages are not only more likely to request and consume sugary products but are also less capable of resisting such influences over time.

These findings suggest that television advertising plays a pivotal role in shaping early food preferences, increasing sugar consumption frequency, and, ultimately, contributing to the high burden of dental caries observed in the pediatric population today.

Globally, some countries have adopted stricter regulations to protect children from exposure to unhealthy food marketing. In Chile, for example, legislation banning advertising aimed at children for unhealthy foods has resulted in a decrease in both children's exposure and their dietary purchases (53). Similarly, the UK has implemented regulations restricting high fat, salt, and sugar food ads during children's programming, with promising results (33, 44). However, despite several recommendations from the WHO (26, 29), many European countries, including Spain, have been slow to enforce such regulations. The results of this study echo those from countries like El Salvador and Australia, where children continue to be exposed to similar advertising and face similar health consequences (48, 49).

6. CONCLUSION

This study showed that food advertisements, mainly for sugary and ultra-processed products, made up a large part of what children are exposed to on television, with Spanish children slightly more exposed than French children.

Both countries used emotional marketing like jingles, bright colors, and mascots, especially in Spain. The inclusion of children in many of these ads made them more relatable and appealing to young viewers.

Ads peaked at midday and in the evening, especially during school holidays when children watch more television, increasing their exposure to these messages.

This repeated exposure shapes eating habits, encourages sugar overconsumption, and contributes directly to the high rates of dental caries still seen among children in both countries.

These findings suggest that stronger regulations on television advertising may be needed to better protect children from the harmful effects of unhealthy food marketing.

7. SUSTAINABILITY

The results highlight the importance of protecting children from unhealthy food advertising. Encouraging healthy habits early can reduce caries prevalence, improve well-being, and ease pressure on healthcare systems. Better advertising regulation is a socially sustainable strategy benefiting individuals and society. Creating healthier food environments protects vulnerable groups like children, promoting a fairer society. Reducing sugary and ultra-processed food consumption also supports healthcare sustainability by lowering preventable diseases. Promoting healthier choices today builds stronger communities tomorrow.

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