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Promotional advertisements present on an online food delivery platform at the onset of the COVID-19 pandemic in Brazilian capitals

Anúncios promocionais em aplicativo de delivery de alimentos nas capitais brasileiras ao início da pandemia de COVID-19

Michele Bittencourt Rodrigues[1], Luísa Helena Vieira Martins[1], Juliana de Paula Matos[1], Caroline Camila Moreira[2], Paula Martins Horta[1]

[1] Universidade Federal de Minas Gerais, Escola de Enfermagem, Departamento de Nutrição. Belo Horizonte, MG, Brasil. Correspondence to: MB RODRIGUES. E-mail: <michele.rodrigues@gmail.com>.
[2] Universidade Federal da Grande Dourados, Faculdade de Ciências da Saúde, Departamento de Nutrição. Dourados, MS, Brasil.

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ABSTRACT

Objective
To describe the prevalence and characteristics of promotional advertisements on an online 'food' delivery platform at the onset of the COVID-19 pandemic in Brazilian capitals, considering the socioeconomic and demographic conditions of the cities.

Methods
A total of 1,754 promotional advertisements published over two days in March 2020 across the 26 Brazilian state capitals and the Federal District were analyzed. These advertisements were categorized into food groups and examined based on their marketing strategies. The prevalence of these advertisements was assessed by the cities' socioeconomic and demographic conditions.

Results
The capitals of the Northeast, along with São Paulo and Porto Alegre, exhibited the highest number of advertisements, a trend directly correlated with the cities' population density. Among advertisements promoting predominantly healthy foods, 'traditional meals and pasta dishes' were most prominent (18.85%), particularly in the Northeast. Promoting this food group was positively associated with the Municipal Human Development Index. In contrast, advertisements for predominantly unhealthy foods were characterized by the promotion of 'sandwiches' (21.49%), 'ultra-processed beverages' (19.54%), and 'pizzas' (13.81%), with high and consistent representation across all capitals. The most common marketing strategies and appeals across the capitals included 'photos,' 'discounts,' 'economic messaging,' and appeals to 'pleasure and taste.'

Conclusion
Advertising on online foof delivery platform in Brazil primarily emphasizes unhealthy foods, employing various marketing strategies and appeals that vary according to the socioeconomic and demographic characteristics of the capitals.

Keywords: COVID-19. e-commerce. Food publicity. Marketing. Mobile applications.

RESUMO

Objetivo
Descrever a participação dos anúncios promocionais veiculados por um aplicativo de delivery de alimentos no início da pandemia de COVID-19 nas capitais brasileiras, considerando as características socioeconômicas e demográficas das cidades.

Métodos
Foram analisados 1.754 anúncios publicados em dois dias de março de 2020 nas 26 capitais estaduais e Distrito Federal. Esses anúncios foram categorizados em grupos de alimentos e bebidas e classificados de acordo com as estratégias e apelos de marketing utilizados. A participação dos anúncios foi descrita em função das características socioeconômicas e demográficas das capitais.

Resultados
As capitais da região Nordeste, além de São Paulo e Porto Alegre, apresentaram o maior número de anúncios promocionais, uma variável que se mostrou diretamente associada à densidade demográfica das cidades. Entre os anúncios de alimentos e bebidas predominantemente saudáveis, destacaram-se os 'pratos de refeições e/ou massas' (18,85%), com maior prevalência nas capitais do Nordeste. A promoção desse grupo de alimentos esteve diretamente associada ao Índice de Desenvolvimento Humano Municipal. Em relação aos anúncios promocionais de alimentos e bebidas predominantemente não saudáveis, os mais representativos foram 'sanduíches' (21,49%), 'bebidas ultraprocessadas' (19,54%) e 'pizzas' (13,81%), com elevada e homogênea participação entre as capitais. As estratégias e apelos de marketing mais frequentes, no conjunto das capitais, incluíram o uso de 'fotos', 'descontos', 'mensagens de economia' e apelos ao 'prazer e sabor'.

Conclusão
Os anúncios promocionais do aplicativo de delivery de alimentos enfatizam predominantemente alimentos e bebidas não saudáveis, utilizando diversas estratégias e apelos de marketing, que podem variar conforme as características socioeconômicas e demográficas das capitais.

Palavras-chave: *Disponibilidade de carotenoides. Pesquisa de orçamentos familiares 2017-2018. Consumo alimentar.*

INTRODUCTION

Economic growth, coupled with increased internet access and the development of digital technologies applicable to smartphones, has significantly propelled the global expansion of e-commerce [1,2]. Within the food service sector, e-commerce has found an especially conducive environment for growth, driven by recent shifts in lifestyle and work patterns that have amplified the demand for convenience and expedited food acquisition [3,4].

A primary method for purchasing food online is through Online Food Delivery Platforms (OFDPs), defined as websites and applications (apps) that connect food establishments with consumers. These platforms allow users to browse menus, review prices and promotions, select desired meals, and have them delivered to their specified location without leaving home [3,4]. OFDPs are part of the digital food environment, which interacts with the physical food environment to influence dietary habits and public health outcomes [5].

The use of OFDPs increased significantly after 2020 due to the Coronavirus Disease 2019 (COVID-19) pandemic, which led to the suspension of non-essential commercial activities [6,7].

Although food services were deemed essential, the imposed restrictions and safety protocols led to the temporary closure of in-person services at out-of-home food establishments. As a result, many food service businesses either expanded or shifted their operations to OFDPs [8]. The convenience and perceived safety offered by these platforms contributed to increased adoption among the population [9].

In Brazil, a survey conducted in October 2020 indicated that the frequency of weekly orders placed through OFDPs, websites, or other food e-commerce platforms rose from 40.5% to 66.1% during the first year of the COVID-19 pandemic, compared to the pre-pandemic period (March 2020). Additionally, the proportion of daily orders increased from 14.2% to 22.1% [10]. Brazil was estimated to represent nearly half (48.8%) of Latin America's online food delivery market in 2020 [11].

The growing reliance on OFDPs raises public health concerns, as the online menus of food establishments are predominantly composed of meals prepared with ultra-processed products [2,12]. This trend runs counter to the recommendations of the Brazilian Dietary Guidelines, which advocate for the prioritization of fresh and minimally processed foods and the avoidance of ultra-processed foods (UPFs) [13]. Furthermore, establishments registered on OFDPs often employ highly persuasive marketing strategies [4], including visual imagery, promotional discounts, and free delivery incentives, which promote the consumption of UPFs [12]. The frequent use of OFDPs may also undermine culinary skills, thereby reducing individuals' autonomy in food preparation [4].

The excessive consumption of UPFs is associated with the increased prevalence of Non-Communicable Diseases (NCDs), such as obesity and cardiovascular conditions [14-16]. In Brazil, the intake of UPFs is progressively displacing the consumption of fresh or minimally processed foods [17]. However, this dietary shift is not uniform across the country, with varying consumption patterns observed among different capitals [17]. Data from the 2020 Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) revealed that 18.5% of adults residing in Brazilian capitals consumed five or more groups of UPFs on the day prior to the interview, with this frequency ranging from 8.6% in Salvador to 27.5% in Porto Alegre [18]. Geographic, cultural, economic, and social factors in the areas where individuals live or frequent influence the availability, accessibility, and marketing of foods [19]. It is hypothesized that these factors similarly impact the food environment of OFDPs across Brazilian capitals. This study aims to analyse the promotional advertisements featured on an OFDP at the onset of the COVID-19 pandemic in Brazilian capitals, taking into account these cities' socioeconomic and demographic characteristics.

METHODS

This ecological study aimed to describe the food and beverage advertisements on an OFDP, specifically iFood, across the 26 Brazilian state capitals and the Federal District. iFood, launched in Brazil in 2011, is the largest food technology company in Latin America, with operations extending to Brazil, Mexico, and Colombia [20]. As of March 2020, iFood was the sole OFDP serving all Brazilian capitals.

The study utilized data from a prior survey that analyzed advertisements published on the OFDP on March 26 and 29, 2020. These dates were randomly selected to represent the early phase of the COVID-19 pandemic in Brazil [21]. The selection of this period was based on March 20, 2020, a critical date marking the onset of the health crisis in Brazil, when a national state of public calamity was declared [22] and guidelines were issued to define the operation of public and essential services [23]. Data collection on both days occurred during peak meal times: lunch (11:00–13:00) and dinner

(18:00–21:00), which are periods of highest demand for OFDPs [24]. According to the 2017-2018 Household Budget Survey, 39.9% of meals consumed outside the home in Brazil occur between 11:00 and 14:00; 21% between 15:00 and 18:00; 19.7% between 7:00 and 10:00; 13.8% between 19:00 and 22:00; and 5.5% between 23:00 and 6:00 [25]. During the designated dates and times, the OFDP's website was accessed, and the names of the 27 capitals were entered into the search field to simulate delivery for each location, using an address automatically generated by the platform. The analysis focused exclusively on the advertisements page, excluding any advertisements in the restaurant menu section. This promotional page was located on the homepage, accessible via a menu icon labeled "Promotions" at the top of the page.

The list of available promotional advertisements for each location was captured using a screenshot tool, resulting in 7,005 advertisements. A random sample of 25% of the advertisements (n=1,754) was then selected, stratified by the day of the week, meal time, and city, following the methodology of the prior study [21].

The advertised food items were classified into the following categories: 'water'; 'natural juices or smoothies'; 'vegetables'; 'fruits'; 'traditional meals and pasta'; 'ultra-processed beverages'; 'ice creams, sweets, and packaged snacks'; 'sandwiches'; 'savory snacks'; and 'pizzas'. In cases where multiple food items were included in a single advertisement (e.g., combos), each item was classified according to its corresponding category. These categories were subsequently regrouped into two major groups of dietary consumption markers: (i) predominantly healthy foods and beverages and (ii) predominantly unhealthy foods and beverages (Chart 1). The classification was based on a previous study that characterized food availability and advertising on OFDPs in Brazil [12], the NOVA food classification system [26], and the Brazilian Dietary Guidelines [13].

Chart 1 – Description of Food and Beverage Groups Present in Promotional Advertisements on an Online Food Delivery Platform.

Food and beverages	Description
Predominantly healthy	
Water	Natural bottled water in traditional and carbonated versions.
Natural juices or smoothies	Fruit and vegetable juices and smoothies. Examples: orange juice; juice made from cabbage, pineapple, and ginger.
Vegetables	Dishes predominantly composed of vegetables. Examples: salad mix, vegetable broth.
Fruits	Dishes predominantly composed of fruits. Examples: fruit salad, apple, banana.
Traditional meals and/or pasta	Dishes predominantly made with fresh and minimally processed foods, pasta, and international cuisine (excluding Asian). Examples: rice, beans, meat, and vegetables; lasagna and paella.
Predominantly unhealthy	
Ultra-processed beverages	Soft drinks, ultra-processed juices, energy drinks, tonic water, and flavored water.
Ice creams, sweets, and packaged snacks	Ice creams, popsicles, chewing gum, candies, chocolates, and packaged snacks such as potato chips.
Sandwiches	Bread-based dishes and ultra-processed ingredients. Examples: hamburgers, hot dogs.
Savory snacks	Fried and baked snacks. Example: croquettes.
Pizzas	Pizzas made predominantly with ultra-processed ingredients. Example: ham pizzas.

Following the coding system adopted by Horta et al. [21], the study examined marketing strategies such as 'free delivery', 'discounts', the use of 'photos', 'combos' (combinations of food and/or beverages offered at a discount), and the appeal of these strategies, including 'healthiness', 'economy', and 'taste and pleasure' (Chart 2).

Data collection was conducted by a team of eight trained collaborators, with data being double-entered into an Excel spreadsheet for accuracy. Coding was checked for consistency, and any discrepancies were resolved by a researcher not involved in the data collection process.

Chart 2 – Examples Of Marketing Strategies and Appeals Present In Promotional Advertisements on an Online Food Delivery Platform.

Marketing Strategies and Appeals	Description
Marketing strategy	
Free delivery	The advertisements highlighted that delivery was free. This information was prominently displayed in green to distinguish it from other details.
Discount	The advertisements emphasized the percentage discount on the product. For example: "Promotion: 42% off".
Photo	Combination of two or more products. For example: "Combo Ayrton Senna + French fries + 310ml drink".
Combo	The advertisements featured a photo of the product.
Appeals	
Healthiness	The advertisement highlights that the meal is healthy. For example: "Healthy, ready, and frozen meals".
Economy	The advertisement emphasizes that with the purchase of one product, you get another one free. For example: "Buy 1 and get 2 – 15cm Grilled Chicken Sandwich".
Taste and pleasure	The message highlights the product's sensory characteristics. For example: "Crispy on the outside and creamy on the inside".

To minimize the potential influence of the platform's algorithm on the targeted advertisements, all searches were performed in incognito mode.

The Municipal Human Development Index (MHDI) and population density were utilized to classify capital based on socioeconomic and demographic characteristics. The MHDI is a composite index encompassing indicators from three dimensions of human development: longevity, education, and income. The index ranges from 0 to 1, with higher values indicating greater human development within a locality [27]. On the other hand, measures the degree of population concentration within a given area, calculated as the ratio between the total population of the area and its land area (inhabitants/km^2) [28]. Both measures refer to data from the 2010 Demographic Census conducted by the *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics).

For statistical analysis, the number of promotional advertisements and the relative participation of food categories and marketing strategies in these advertisements were calculated for each Brazilian capital. The relative participation of food categories and marketing strategies was then estimated according to the median MHDI and population density. Statistical differences were tested using Student's *t*-test with a significance level of 5%. All analyses were conducted using Stata software (version 17.0).

RESULTS

The number of advertisements varied among the capitals, with the highest counts observed in São Paulo (100), Porto Alegre (100), Fortaleza (99), João Pessoa (99), and Recife (99). In contrast the capitals with the fewest advertisements were Palmas (2), Macapá (4), and Rio Branco (5), all situated in the northern region of the country (Table 1).

Among promotional advertisements featuring predominantly healthy foods and beverages, the most frequently promoted food group was 'traditional meals and/or pasta' (18.85%), with particularly high prevalence in Teresina (40%) and Rio Branco (40.0%). Other capitals with a significant proportion of advertisements promoting 'traditional meals and/or pasta' included Natal (38.71%), Porto Velho (33.33%), João Pessoa (30.30%), and São Luís (30.00%). Other categories of predominantly healthy food groups had less than 5% representation in most capitals' advertisements, with notable exceptions in Maceió for 'natural juices or smoothies' (8.86%), São Paulo for 'vegetables' (8.00%), and Aracaju for 'fruits' (6.76%) (Table 1).

Table 1 – Participation of food and beverage groups in promotional advertisements on an online food delivery platform in Brazilian capitals. 2020.

Region/ Capitals	Number of advertisements	Predominantly healthy foods and beverages Relative frequency (%)					Predominantly healthy foods and beverages Relative frequency (%)				
		Water	Natural juices or smoothies	Vegetables	Fruits	Traditional meals and/or pasta	Ultra-processed beverages	Ice creams, sweets, and packaged snacks	Sandwiches	Savory snacks	Pizzas
Midwest											
Brasília	94	0.00	1.06	4.26	0.00	20.21	18.09	3.19	22.34	0.00	13.83
Campo Grande	74	0.00	0.00	0.00	0.00	12.16	16.22	4.05	39.19	1.35	12.16
Cuiabá	42	0.00	0.00	2.38	2.38	4.76	16.67	9.52	33.33	16.67	14.29
Goiânia	95	0.00	0.00	0.00	2.11	17.89	11.58	12.63	24.21	4.21	9.47
Northeast											
Aracajú	74	0.00	0.00	2.70	6.76	9.46	29.73	13.51	14.86	0.00	24.32
Fortaleza	99	0.00	1.01	2.02	1.01	20.20	16.16	2.02	15.15	1.01	18.18
João Pessoa	99	1.01	1.01	3.03	3.03	30.30	24.24	7.07	21.21	3.03	11.11
Maceió	79	0.00	8.86	3.80	1.27	27.84	15.19	7.59	17.72	8.86	15.19
Natal	31	0.00	0.00	3.23	0.00	38.71	25.81	0.00	16.13	0.00	25.81
Recife	99	0.00	0.00	3.03	1.01	8.08	17.17	4.04	23.23	5.05	13.13
Salvador	96	0.00	1.04	1.04	0.00	18.75	30.21	1.04	12.50	4.17	26.04
São Luís	20	0.00	0.00	0.00	5.00	30.00	0.00	0.00	5.00	0.00	20.00
Teresina	15	0.00	0.00	0.00	0.00	40.00	33.33	0.00	13.33	0.00	6.67
North											
Belém	90	0.00	1.11	2.22	2.22	15.56	36.67	1.11	14.44	1.11	13.33
Boa Vista	10	0.00	0.00	0.00	0.00	10.00	30.00	0.00	60.00	0.00	0.00
Macapá	4	0.00	0.00	0.00	0.00	0.00	25.00	0.00	25.00	25.00	0.00
Manaus	72	0.00	0.00	1.39	0.00	25.00	33.33	0.00	25.00	4.17	16.67
Palmas	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Porto Velho	18	0.00	0.00	0.00	0.00	33.33	16.67	5.56	22.22	22.22	0.00
Rio Branco	5	0.00	0.00	0.00	0.00	40.00	0.00	0.00	20.00	0.00	0.00
Southeast											
Belo Horizonte	97	0.00	0.00	4.12	2.06	11.34	26.80	4.12	16.49	10.31	29.90
Rio de Janeiro	95	0.00	1.05	3.16	0.00	24.21	16.84	2.11	14.74	1.05	20.00
São Paulo	100	0.00	0.00	8.00	0.00	12.00	13.00	1.00	15.00	5.00	22.00
Vitória	85	0.00	2.35	2.35	3.53	15.29	21.18	9.41	25.88	11.76	9.41
South											
Curitiba	81	0.00	0.00	2.47	0.00	13.58	20.99	4.94	25.93	1.23	25.93
Florianópolis	78	0.00	0.00	0.00	0.00	19.23	21.79	0.00	24.36	3.85	15.38
Porto Alegre	100	0.00	0.00	1.00	0.00	11.00	11.00	0.00	33.00	5.00	10.00
Total	1754	0.04	0.65	1.86	1.12	18.85	19.54	3.44	21.49	5.00	13.81

In contrast, advertisements featuring predominantly unhealthy foods and beverages were dominated by three food groups: 'sandwiches' (21.49%), 'ultra-processed beverages' (19.54%), and 'pizzas' (13.81%). 'Sandwiches' appeared in more than 20.00% of the advertisements in over half of the Brazilian capitals, with an especially high concentration in Boa Vista (60.00%). 'Ultra-processed beverages' constituted approximately 37.00% of the advertisements in Belém, while 'pizzas' were featured in about 30.00% of the advertisements in Belo Horizonte (Table 1).

The most frequently employed marketing strategies across Brazilian capitals were 'photos' and 'discounts,' with participation rates of 94.87% and 93.29% of the advertisements, respectively. In 22 out of the 27 capitals, the use of 'photos' exceeded 90.00%, while 'discounts' surpassed 80.00% in 24 out of the 27 capitals. Additionally, 'free delivery' (43.21%) and 'combos' (26.88%) were commonly utilized strategies. In Palmas, all advertisements promoted 'free delivery,' and in Belém, over 40.00% of the advertisements featured 'combos' (Table 2).

Table 2 – Participation of marketing strategies and appeals in promotional advertisements on an online food delivery platform in Brazilian capitals. 2020.

Region/ Capitals	Marketing strategy Relative frequency (%)				Appeal Relative frequency (%)		
	Free delivery	Discount	Photo	Combo	Healthiness	Economy	Taste and pleasure
Midwest							
Brasília	21.28	74.47	95.74	23.40	2.13	15.96	11.70
Campo Grande	35.14	94.59	95.95	27.03	0.00	2.70	8.11
Cuiabá	45.24	100.00	100.00	21.43	2.38	23.81	2.38
Goiânia	44.21	89.47	96.84	21.05	4.21	9.47	11.58
Northeast							
Aracajú	47.30	97.30	97.30	37.84	1.35	13.51	5.41
Fortaleza	56.57	77.78	97.98	23.23	9.09	14.14	15.15
João Pessoa	37.37	85.86	89.90	32.32	1.01	18.18	9.09
Maceió	50.63	93.67	88.61	30.38	1.27	15.19	10.13
Natal	32.26	96.77	100.00	25.81	3.23	16.13	19.35
Recife	28.28	78.79	86.87	26.26	2.02	14.14	13.13
Salvador	46.88	98.96	92.71	37.50	1.04	16.67	14.58
São Luís	5.00	100.00	85.00	15.00	0.00	10.00	5.00
Teresina	26.67	86.67	93.33	33.33	0.00	13.33	26.27
North							
Belém	41.11	93.33	93.33	43.33	2.22	13.33	15.56
Boa Vista	80.00	100.00	100.00	30.00	0.00	50.00	0.00
Macapá	0.00	100.00	100.00	25.00	0.00	50.00	0.00
Manaus	34.72	95.83	93.06	37.50	4.17	9.72	11.11
Palmas	100.00	100.00	100.00	0.00	0.00	0.00	50.00
Porto Velho	38.89	83.33	94.44	33.33	5.56	16.67	5.56
Rio Branco	0.00	100.00	100.00	0.00	0.00	0.00	20.00
Southeast							
Belo Horizonte	48.45	92.78	93.81	35.05	0.00	26.80	15.46
Rio de Janeiro	54.74	98.95	85.26	25.26	14.74	10.53	10.53
São Paulo	59.00	91.00	97.00	26.00	3.00	25.00	14.00
Vitória	72.94	100.00	95.29	34.12	0.00	15.29	29.41
South							
Curitiba	41.98	97.53	98.77	28.40	2.47	14.81	6.17
Florianópolis	58.97	98.72	92.31	32.05	2.56	16.67	3.85
Porto Alegre	59.00	93.00	98.00	21.00	1.00	18.00	14.00
Total	43.21	93.29	94.87	26.88	2.35	16.67	12.89

Regarding marketing appeals, most promotional advertisements conveyed 'messages of economy' (16.67%) and 'taste and pleasure' (12.89%). In Boa Vista and Macapá, half of the advertisements featured 'messages of economy,' while in Palmas, half of the advertisements emphasized 'taste and pleasure' appeals. 'Healthiness' messages were less common, appearing in approximately 2.00% of the advertisements across the capitals, though in Rio de Janeiro, this appeal reached nearly 15.00% (Table 2).

Significant differences were observed in the total number of advertisements and the representation of food and beverage groups in relation to the MHDI and population density. Capitals with population densities above the median had a significantly higher number of advertisements (M2: 82.77 vs. M1: 48.43, p=0.0122). Conversely, ads promoting 'traditional meals and/or pasta' were more prevalent in capitals with MHDI values below the median (M1: 23.15% vs. M2: 13.47%, p=0.0248). 'Vegetables' were more commonly featured in advertisements from capitals with higher population densities than those with lower densities (M2: 2.78% vs. M1: 1.00%; p=0.0135). Similarly, 'pizzas' were more frequently advertised in capitals with population densities above the median (M2: 19.68% vs. M1: 8.36%, p=0.0003) (Table 3).

Table 3 – Participation of food and beverage groups in promotional advertisements on an online food delivery platform in Brazilian capitals according to their socioeconomic and demographic characteristics. 2020.

Number of advertisements/ Food groups	Municipal Human Development Index (MHDI)					Demographic density (inhabitants/Km²)				
	Median 1 (0.72-0.77)		Median 2 (0.78-0.85)		*p*	Median 1 (12.57-1854.1)		Median 2 (2837.53-7786.44)		*p*
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Number of Advertisements	54.07	10.19	78.58	8.39	0.0849	48.42	10.10	82.76	7.43	0.0122*
Predominantly healthy foods and beverages										
Water	0.07	0.26	0.00	0.00	0.3815	0.00	0.00	0.08	0.28	0.3086
Natural juices or smoothies	0.87	2.26	0.37	0.74	0.4738	0.79	2.36	0.50	0.74	0.6742
Vegetables	1.50	1.44	2.31	2.40	0.2840	1.00	1.54	2.78	1.92	0.0135*
Fruits	1.35	2.09	0.84	1.29	0.4638	0.57	0.96	1.72	2.24	0.0901
Traditional meals and/or pasta	23.15	12.67	13.47	6.67	0.0248*	19.00	13.21	18.69	9.53	0.9447
Predominantly unhealthy foods and beverages										
Ultra-processed beverages	22.23	11.31	16.18	6.85	0.1162	19.61	11.41	19.47	8.46	0.9720
Ice creams, sweets, and packaged snacks	2.80	4.02	4.25	4.22	0.3704	3.12	4.21	3.79	4.11	0.6792
Sandwiches	20.39	12.22	22.87	10.41	0.5805	24.37	13.75	18.39	7.24	0.1749
Savory snacks	4.97	8.00	5.04	5.27	0.9818	6.25	8.69	3.66	3.83	0.3340
Pizzas	12.70	9.54	15.20	8.18	0.4783	8.36	6.92	19.68	6.87	0.0003*

Note: *Statistically significant.

In terms of marketing strategies and appeals, only the presence of 'free delivery' showed a significant difference. It was more frequently advertised in capitals with a higher median MHDI (M1: 53.41% vs. M2: 35.04%, p=0.0318) (Table 4).

Table 4 – Participation of marketing strategies and appeals in promotional advertisements on an online food delivery platform in Brazilian capitals according to their socioeconomic and demographic characteristics. 2020.

Marketing strategy/appeal	Municipal Human Development Index (MHDI)					Demographic density (inhabitants/Km²)				
	Median 1 (0.72-0.77)		Median 2 (0.78-0.85)		*p*	Median 2 (0.78-0.85)		Median 1 (0.72-0.77)		*p*
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Marketing strategy										
Free delivery	35.04	21.64	53.41	19.82	0.0318*	41.20	27.00	45.37	17.15	0.6398
Discount	92.55	7.96	94.21	7.26	0.5817	93.58	7.71	92.98	7.70	0.8415
Photo	94.17	5.01	95.75	4.03	0.3844	95.97	3.66	93.68	5.30	0.2011
Combo	28.72	10.63	24.57	9.15	0.2936	25.56	12.45	28.29	6.78	0.4906
Appeals										
Healthiness	2.06	2.56	2.71	4.04	0.6184	1.75	1.89	3.00	4.26	0.3290
Economy	18.07	13.66	14.92	8.29	0.4904	16.92	15.56	16.40	4.88	0.9097
Taste and pleasure	11.38	7.53	14.77	13.09	0.4067	12.62	13.12	13.18	6.55	0.8910

Note: *Statistically significant.

DISCUSSION

This study provides a comprehensive analysis of food and beverage advertisements on OFDPs in Brazilian capitals during the initial stages of the COVID-19 pandemic. The findings elucidate the volume of advertisements, the representation of various food and beverage groups, and the distinct marketing strategies and appeals employed, which vary according to the cities' socioeconomic and demographic characteristics.

The results indicate that while OFDPs predominantly promote unhealthy foods across the country's capitals, there are notable variations in the presentation of advertisements across different localities. Specifically, capitals in the Northern regions exhibited a lower volume of promotional advertisements, whereas more densely populated capitals, such as those in the Northeast, São Paulo, and Porto Alegre, showed a higher volume. This suggests that residents in these areas are exposed to more advertisements, irrespective of the type of food promoted. This observation is particularly significant given that, despite the integral role of OFDPs in the modern food system, there remains a paucity of research on how social and economic disparities are reflected within these platforms. The preliminary results suggest that OFDPs allocate more resources to promotional activities in areas with higher population densities, likely targeting regions with a greater potential consumer base.

Regarding the representation of food and beverage groups in these advertisements, it was observed that 'meal dishes and/or pasta' were more frequently advertised in the capitals of the Northeast region. This region's cuisine is deeply influenced by indigenous, African, and Portuguese culinary traditions, characterized by a rich mix of flavors and the extensive use of cassava, sweet potatoes, flours, fruits, sun-dried meat, and fish. These ingredients are commonly featured in culinary preparations that constitute complete meal dishes [29,30]. According to Botelho et al. [31], local restaurants often replicate familiar and regional recipes as a strategic approach to connect with customers. Furthermore, previous studies have indicated a strong adherence to traditional dietary patterns in the Northeast, particularly those involving the consumption of rice, beans, and meat [32]. Indeed, the 'meal dishes and/or pasta' category represents typical Brazilian culinary practices, composed of fresh and minimally processed foods with significant cultural significance, such as rice, beans, meats, vegetables (including non-conventional edible plants), cassava, corn, and their derivatives [33-35]. In this context, the efforts by OFDPs to replicate local food culture patterns merit further discussion.

However, Matos et al. [36], in their evaluation of meal offerings in OFDPs across various Latin American countries, caution that while the preservation of traditional cuisine in food services is widely recommended, it is important not to assume that these establishments faithfully reproduce local culinary characteristics or produce authentic dishes according to traditional recipes. Moreover, they highlight the lack of detailed information about the meals' ingredients, complicating efforts to ascertain whether the 'meal dishes and/or pasta' are composed of fresh and minimally processed foods or if they authentically represent regional cuisine.

The prevalence of 'vegetable' advertisements was higher in capitals with greater population density, particularly in São Paulo. A study evaluating promotional advertisements on iFood during the COVID-19 pandemic in São Paulo revealed that in areas with higher socioeconomic status, there is a greater demand for and supply of healthier foods. The researchers attributed this trend to higher educational levels and possibly increased awareness of healthy eating and diet-related diseases [37]. Additionally, the Southeast region, where São Paulo is located, is one of the Brazilian regions with the highest prevalence of regular fruit and vegetable consumption [38], which may be reflected in the availability of these items within the digital food environment.

In contrast, advertisements for predominantly unhealthy food and beverage groups, such as 'sandwiches,' 'ultra-processed beverages,' and 'pizzas,' were prevalent across all Brazilian capitals, showing no significant variation with respect to the MHDI or population density, except for the 'pizzas' category, which was more frequently advertised in capitals with higher population density. These findings underscore the homogeneity in the high prevalence of UPFs within the digital food environment of Brazilian OFDPs as documented in previous studies [12,21,36,39,40]. Market research

has consistently highlighted that UPFs or meals prepared with these products are among the most ordered items in OFDPs [41,42]. Considering that these consumption patterns mirror the food groups Brazilians report consuming most often outside the home [25], it is plausible that during the COVID-19 pandemic, OFDPs may have supplanted traditional dining-out experiences. The widespread promotion of predominantly unhealthy foods is particularly concerning given that the consumption of such foods was associated with health conditions that increased the risk of adverse outcomes in COVID-19 patients [43].

This study also underscores the use of marketing strategies and persuasive appeals in promotional advertisements, which are designed to influence consumer behavior and decision-making. Notably, we observed that economic appeals were prominently featured in these advertisements, likely in response to the economic crisis precipitated by the COVID-19 pandemic [44]. Previous research has established that economic appeals are frequently employed in marketing UPFs, particularly campaigns targeting socially vulnerable populations [45]. However, a study conducted during the early stages of the COVID-19 pandemic in Brazil, which focused on social media posts by OFDPs, found that these companies infrequently utilized economic appeals [46]. This divergence suggests that OFDPs companies tailor their advertising strategies to the specific characteristics and objectives of the digital platform in use, leading to the hypothesis that economic appeals are more commonly employed in platforms that offer a direct purchasing option, such as within the OFDP environment.

In light of these observations, it becomes clear that the digital food environment created by OFDPs must be incorporated into discussions surrounding regulatory public policies and other initiatives to promote healthy eating. This entails increasing the availability of healthy foods, particularly through targeted promotional efforts, and considering the unique social, geographical, economic, and cultural characteristics of different regions across the country. Additionally, it is imperative to curtail the persuasive marketing of foods detrimental to public health to protect the population. Nevertheless, regulating the availability and advertising of foods in the digital sphere presents considerable challenges. There is no specific regulation governing food marketing within this context or in the unique circumstances of OFDPs. However, relevant provisions from existing legislation, such as the definitions of abusive and misleading advertising in the Consumer Protection Code [47] and the General Data Protection Law [48], could be applied.

Furthermore, a critical reflection is necessary concerning OFDPs, extending beyond the nutritional profile and marketing of the products offered on these platforms. Although this aspect was not evaluated in the present study, it is essential to scrutinize the labor relations associated with OFDPs, particularly the conditions faced by delivery workers, and the monopolistic dominance of major platforms like iFood in the Brazilian OFDPs market [49]. An evaluation of the experiences of delivery workers during the peak of the COVID-19 pandemic revealed a significant deterioration in working conditions, characterized by severe violations of the Human Right to Adequate and Healthy Food, including food insecurity and heightened risk of infection due to frequent interpersonal contact with customers [50]. This situation highlights the urgent need for regulatory discussions addressing all aspects of the production and distribution chain associated with OFDPs, given their profound implications for individual and planetary health.

Finally, regarding the limitations of this study, data collection focused on analyzing promotional advertisements by restaurants on a single OFDPs operating in Brazilian capitals during the early weeks of the COVID-19 pandemic. Consequently, due to the absence of pre-pandemic data, it is to determine whether the findings differ from those of the pre-pandemic period. We cannot assert that these advertisements represent other pandemic stages or potential variations over

time. Additionally, the study's focus on promotional advertisements from a single OFDP does not capture the full range of offerings by restaurants registered on these platforms, and the exclusive focus on Brazilian capitals limits the generalizability of the findings to other cities, even within the same macro-region. Future research should consider including other OFDPs companies and cities to further advance understanding in this area. Lastly, the identification of food and beverage groups in the advertisements is constrained by the lack of ingredient lists and the potential exclusion of certain meal types not addressed in the questionnaire used.

CONCLUSION

This study offers a comprehensive analysis of promotional advertisements on an OFDP at the onset of the COVID-19 pandemic. The findings indicate a higher number of advertisements in capitals located in the Northern region of Brazil, coupled with a higher representation of predominantly unhealthy food and beverage groups, with minimal variation across different capitals. In contrast, the representation of predominantly healthy food and beverage groups in these advertisements was notably lower, except for the 'meal dishes and/or pasta' category, which was more frequently observed in capitals with a lower MHDI. Moreover, the study highlights the extensive use of various marketing strategies and appeals, focusing on those emphasizing economic benefits. These results underscore the imperative for public policy discourse and regulatory measures concerning OFDPs, aimed at fostering a healthier and more equitable digital food environment.

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CONTRIBUTORS

Conceptualization: MB RODRIGUES and PM HORTA. Data curation: LHV MARTINS and MB RODRIGUES. Formal analysis: MB RODRIGUES, PM HORTA, and JP MATOS. Methodology: MB RODRIGUES, PM HORTA, and JP MATOS. Supervision: MB RODRIGUES and PM HORTA. Writing – original draft: MB RODRIGUES, LHV MARTINS, and JP MATOS. Writing – review & editing: MB RODRIGUES, PM HORTA, JP MATOS, and CC MOREIRA.