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PILOT DATA ANALYSIS

## The Marketing of Ultraprocessed Foods in a National Sample of U.S. Supermarket Circulars: A Pilot Study



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**Introduction:** This study aimed to quantify the prevalence of advertisements for ultraprocessed foods and beverages in U.S. supermarket circulars, which are digital and print marketing materials with weekly sales promotions.

**Methods:** Food and beverage advertisements on the first page of 4,181 weekly circulars from 453 stores across 6 states were analyzed from August 2019 to September 2019. Products were classified into 1 of 4 mutually exclusive categories on the basis of the extent and purposes of their industrial processing using a variant of the NOVA classification system adapted for the U.S. food supply: unprocessed and minimally processed, basic processed, moderately processed, and highly processed.

**Results:** A total of 86,099 food and beverage advertisements were classified. Highly processed foods accounted for 45.7% of advertisements, followed by unprocessed/minimally processed foods at 41.2%, moderately processed foods at 8.0%, and basic processed foods at 5.1%.

**Conclusions:** U.S. supermarket circulars advertise a high proportion of processed and highly processed foods and beverages.

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### INTRODUCTION

Ultraprocessed foods—formulations of ingredients created through a series of industrial processes that are no longer recognizable as their original plant or animal source—have been shown to be significant drivers of unintentional overeating, weight gain, poor diet quality, and adverse health outcomes.<sup>1</sup> Although some level of processing may be necessary to ensure food safety and longevity, ultraprocessed foods, which tend to be stripped of many key nutrients and contain added preservatives to extend shelf life, appear uniquely harmful to diet quality and health.<sup>1</sup> Increases in the dietary share of ultraprocessed foods have been linked with obesity and cardiovascular disease as well as diets high in sugar, saturated fats, and trans-fats and low in protein, fiber, and potassium.<sup>1</sup> The amount of ultraprocessed foods in

American diets has increased dramatically over the past decades and now comprises almost 60% of calories consumed in the U.S.<sup>2</sup>

Relatively little is known about how ultraprocessed foods are marketed. Food and beverage marketing profoundly impacts consumer preferences and can

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subsequently impact diet and health.<sup>3</sup> A novel way to understand retailer marketing is to examine store circulars, which are digital and print marketing materials with weekly sales promotions. Customers identify circulars as the most influential type of local marketing; 85% of households use print circulars delivered to the home, and 79% use circulars distributed in stores.<sup>4</sup> This study categorizes the food and beverages advertised in the weekly circulars of 453 U.S. supermarkets across 6 states on the basis of their level of processing to better understand the marketing of processed goods.

## METHODS

This study used a random subsample of store circular data from a novel longitudinal sample of Supplemental Nutrition Assistance Program (SNAP)-authorized retailers from 6 states (California, Connecticut, Florida, Nebraska, New Jersey, and Texas). The states were selected so that there was at least 1 state from each of the 4 U.S. census regions. SNAP-authorized retailers must meet basic criteria regarding the inventory and sale of staple foods. Although SNAP itself supports households with low incomes, SNAP-authorized retailers include virtually all supermarkets and grocery stores and therefore represent retailers utilized by households with a wide range of incomes. Retailers were identified and randomly sampled within each state using the SNAP retail locator from the U.S. Department of Agriculture. Retailers were eligible to be included in the sample if they had a weekly circular available in print or online. Retailers were excluded if they did not have a physical shopping location or were not currently open for business.

Circulars were collected from store websites from August through September 2019. Within each circular, individual food and beverage advertisements (ads), that is, images or descriptions of products with a corresponding price, were evaluated from the first page. The front page was analyzed because consumers frequently scan the cover of circulars for promotions and discounts.<sup>5</sup> For each ad, the type and brand of the food or beverage were documented. Nonfood items were excluded. Products were generally pictured in individual ads. However, if an ad included multiple products (e.g., Pepsi for \$1 with multiple images of Pepsi-brand beverages), the ad was only coded for the first product (left to right, top to bottom) or the top product (in the case of overlapping images) to avoid double counting the same promotion.

Products were then categorized according to their degree of industrial processing using a system developed by Jennifer Poti and colleagues to adapt the NOVA system to a U.S. context.<sup>6</sup> This system, which is widely used in research, has good inter-rater reliability and strong predictive validity when applied to U.S. foods (its classification of highly processed foods is strongly predictive of high sodium and added sugar contents).<sup>7</sup> Per the coding guidelines, foods and beverages were grouped into 1 of 4 mutually exclusive categories on the basis of the extent and purposes of their industrial processing: unprocessed and minimally processed (e.g., fresh fruits and vegetables, whole grains, brown rice, eggs, unseasoned meat), basic processed (e.g., unsweetened/unflavored canned fruits and vegetables, flour, white rice, unseasoned canned meat), moderately processed (e.g., sweetened/flavored canned

fruits and vegetables, whole-grain breads with no added sugar/fat, seasoned refrigerated, frozen, or canned meat), and highly processed, which was used interchangeably with ultraprocessed (e.g., fruit snacks, refined grain breads with added sugar/fat, grain-based snacks such as crackers and pretzels, pressed/formed lunchmeats such as bologna and salami, breaded meats such as fish sticks and chicken nuggets).

A team of 7 research assistants coded ads and classified products. Research assistants were trained in the coding protocol by 2 project managers with training in nutrition and the analysis of the healthfulness of food products (one with a master's in public health, one with a PhD and RD). Research assistants were also given a detailed written copy of the protocol with clear examples of how to code different types of advertisements to refer to during coding. To ensure coding consistency, research assistants coded 2 sample batches of circulars, containing 241 separate advertisements, and answers were compared with an expert-prepared answer key developed by the project managers. Coding could proceed after research assistants achieved 95% agreement with the expert answer key; all research assistants reached 95% agreement after one batch but were still given the second batch to ensure comprehensive training. Food manufacturers' websites were consulted to retrieve the ingredient lists of products to aid in classification if needed. Spot checks were also randomly conducted by 1 of the project managers on 2% of the final analytic sample to ensure that the research assistants' coding was still consistent with expert analysis (only 1 research assistant was found to have inconsistencies during the spot checks; in this case, the project manager redid the coding for this individual). The proportion of ads was calculated in each processing level, of all food and beverage ads observed.

## RESULTS

The final analytic sample included 86,099 food and beverage ads from the front pages of 4,181 weekly circulars from 453 stores across 6 states (Table 1). Overall, highly processed foods made up 45.7% of ads ( $n=39,390$ ), followed by unprocessed/minimally processed foods at 41.2% ( $n=35,476$ ), moderately processed foods at 8.0% ( $n=6,875$ ), and basic processed foods at 5.1% ( $n=4,358$ ) (Figure 1).

## DISCUSSION

This is the first study to quantify the prevalence of ads for ultraprocessed foods and beverages in U.S. supermarket circulars; previous studies have focused on food group or nutrient composition.<sup>8,9</sup> These novel results suggest that U.S. supermarket circulars advertise a high proportion of processed and highly processed foods and beverages. This finding is in line with past studies, which have found that the types of foods advertised in U.S. supermarket circulars do not reflect national guidelines for diet quality because they over-represent items linked with poorer health, such as items high in sodium and added sugars, and under-represent foods linked with better health, such as fruits and vegetables.<sup>9</sup>

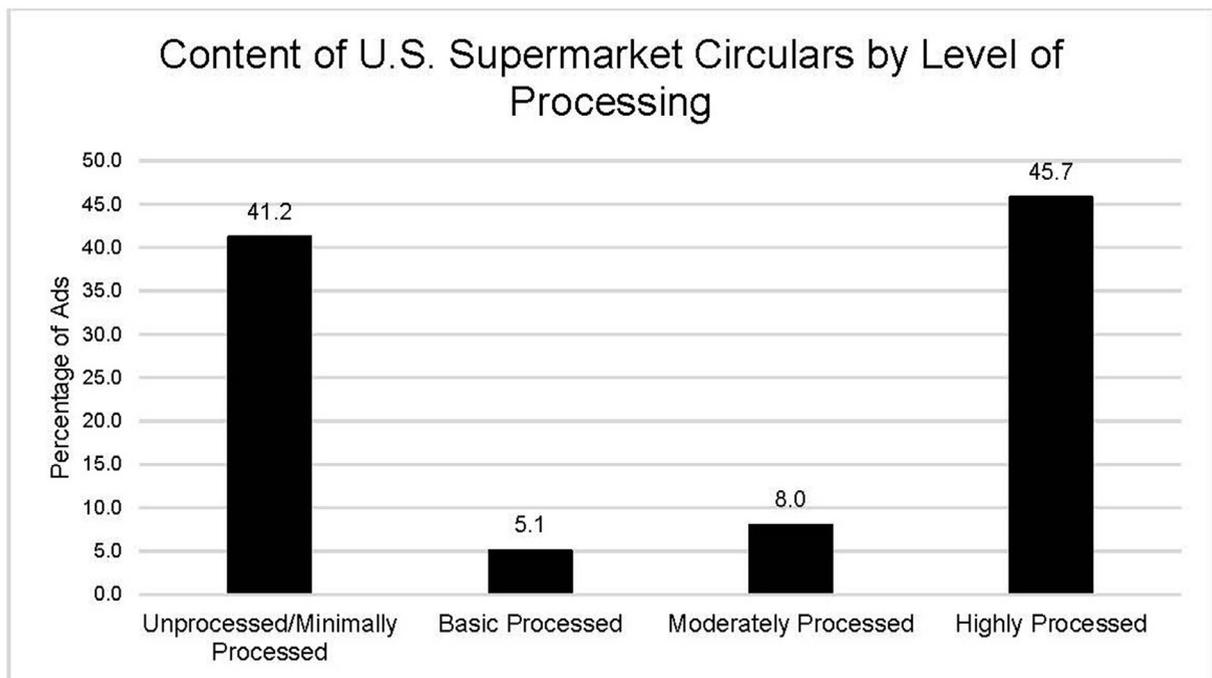
**Table 1.** Store and Circular Characteristics by State

Characteristics	California	Connecticut	Florida	Nebraska	New Jersey	Texas	Full sample
Number of stores	66	74	74	83	77	79	453
Number of circulars	590	722	660	742	757	710	4,181
Average number of ads on first page	17.20	23.12	13.04	18.31	31.01	19.14	20.59
Average number of unprocessed/minimally processed ads	7.81	9.12	5.30	7.31	11.88	8.97	8.49
Average number of basic processed ads	0.57	1.35	0.77	0.58	2.30	0.52	1.04
Average number of moderately processed ads	1.34	2.01	1.10	1.17	2.89	1.20	1.64
Average number of highly processed ads	7.48	10.63	5.87	9.26	13.95	8.45	9.42

ad, advertisement.

Although the reason for such high levels of ultra-processed food advertisements in supermarket circulars cannot be determined from this study, there are several potential explanations. Given that U.S. households consume large amounts of ultraprocessed foods, the circulars could simply be reflecting stores' efforts to respond to consumer preferences. However, a previous analysis found that the products advertised in supermarket circulars scored significantly worse on a measure of diet quality, on average, than the actual average dietary intake of U.S. individuals, suggesting that the circulars are not simply a reflection of existing

diet.<sup>9</sup> Rather, it may be that grocers and/or food manufacturers seek to persuade consumers, through advertising, to purchase these highly processed products given that they may be particularly profitable because their commodity ingredients tend to be quite cheap and because they may be habit forming for consumers.<sup>1</sup> Exposure to food and beverage marketing through supermarket circulars is an important and modifiable determinant of consumer purchasing behavior. The considerable advertising observed combined with the frequency of use suggests that supermarket circulars may be an obstacle to healthy eating.



**Figure 1.** Proportion of ads in each level of food processing among all U.S. supermarket circulars in the analytic sample. ad, advertisement.

Interestingly, basic processed and moderately processed foods were advertised less frequently than items on both ends of the processing spectrum in this study. A similar pattern was observed in Brazilian supermarket circulars.<sup>10</sup> This may be because the products in these categories are less attention grabbing and therefore less likely to be advertised (e.g., cooking ingredients made up a significant proportion of basic processed foods). It is also possible that supermarkets simply stock fewer of these items than unprocessed and ultraprocessed goods.

### Limitations

This study has limitations. The data collection was limited to 2 months, and the analysis was restricted to the first page of the circulars. There is some evidence from other countries that unprocessed foods may be over-represented and that highly processed foods may be under-represented on the first page of store circulars; therefore, the calculated proportion of highly processed foods may be an underestimate.<sup>10</sup> In addition, the classification system uses broad categories, which results in some foods that are linked with poorer health, such as red meat, being mixed with healthful foods, such as whole fruits and vegetables, in the same category. Although this may result in erroneous conclusions about the healthfulness of foods that end up in these unprocessed or minimally processed categories, the highly processed category in this scale, that is, the category of interest for this study, has been found to be highly predictive of poorer diet quality.<sup>7</sup> Strengths of this study include the large sample size of retailers, and broad geographic coverage across several states spanning all the 4 U.S. census regions.

### CONCLUSIONS

In the U.S., food-at-home spending (food purchased from supermarkets, convenience stores, warehouse club stores, supercenters, and other retailers) accounted for 51.9% of all food expenditures in 2020.<sup>11</sup> This was the first-year that food-at-home spending comprised more than half of food spending since 2008, during the Great Recession. The average supermarket contains over 28,000 items for purchase.<sup>12</sup> Weekly supermarket circulars help to shape food purchasing decisions by providing information about price discounts and highlighting specific products. This advertisement vehicle may be particularly influential for individuals with limited financial resources, who may rely more heavily on discounts and decision-making aids and who may be more

affected when unhealthy products are heavily advertised.<sup>13</sup> Increasing the proportion of healthier foods and beverages featured on the front page of supermarket circulars may help to promote healthier purchases.

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### CREDIT AUTHOR STATEMENT

Anthony Zhong: Conceptualization, Methodology, Data Curation, Formal Analysis, Writing - Original Draft. Erica L. Kenney: Supervision, Writing - Original Draft. Jane Dai: Conceptualization, Methodology, Data Curation, Writing - Review & Editing, Project Administration. Mark J. Soto: Writing - Review & Editing. Sara N. Bleich: Supervision, Writing - Review & Editing.

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