

Analyzing the prevalence of ultra-processed products sold á la carte among elementary schools in Houston, Texas

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Background

The National School Lunch Program (NSLP) and National School Breakfast Program (SBP) provide low-to-no-cost, nutritiously balanced meals for children in public, non-profit, and residential childcare institutions.^{1,2} Both programs are administered by the U.S. Department of Agriculture (USDA) and are highly utilized: In 2024, more than 4.8 billion lunches and 2.5 billion breakfasts were served to children nationwide.³ Meals served through both programs are required to follow nutrition standards set by the USDA and align with the current Dietary Guidelines for Americans.⁴ Meals are required to include fruits, vegetables, whole grains, and low-fat or fat-free milk in age-appropriate servings while limiting sodium, added sugars, and saturated/trans fats.⁴

Despite these nutrition standards and the availability of healthy foods through these programs, child obesity rates remain high.⁵ Researchers and critics suggest the extensive availability of foods sold through vending machines and á la carte lines, referred to as “competitive foods,” gives opportunity for children to bypass nutritious lunches for these items, undermining the efforts of federally regulated school meal programs.^{6,7} In fact, before the Healthy, Hunger-Free Kids Act was passed in 2010, there were few to no regulations on what competitive items could be sold.⁸ This left the implementation of these regulations to state agencies and local school districts.

In response, the USDA established the Smart Snacks standards to ensure that competitive items sold in schools align with the Dietary Guidelines for Americans.⁸ The standards require that all competitive foods sold



in schools follow specific nutrient and ingredient requirements.⁸ However, Smart Snacks standards do not regulate all components of competitive foods, such as added sugars and cosmetic ingredients, creating loopholes for companies to formulate highly processed products that technically comply with the standards but contradict their underlying nutritional goals.⁸

According to the Nova classification, ultra-processed foods (UPFs) are categorized as foods that undergo intense industrial formulations, contain few whole-food ingredients, are produced through significant physical and chemical processing, and are designed for long shelf life, high sensory appeal, and maximum convenience.^{9,10} Foods are considered UPFs if they contain at least one non-culinary ingredient (such as casein, dextrose, high-fructose corn syrup, maltodextrin) and/or a cosmetic additive (such as flavors, emulsifiers, sweeteners, colors).^{9,10} These ingredients are added to intensify the sensory impact of foods, making them fattier, sweeter, or saltier than low- or minimally processed foods, and often higher in saturated or trans fats and lower in dietary fiber, micronutrients, and other bioactive compounds.^{9,10}

UPFs are designed to be hyper-palatable, meaning they are engineered to have highly appealing flavors, textures, and appearances. They are formulated to be habit-forming and are sometimes “quasi-addictive,” which can encourage their overconsumption and contribute to unhealthy eating patterns.^{9,10} UPFs are also aggressively marketed and easily accessible,

which may increase consumers’ exposure to them and normalize their regular consumption.^{9,10} Some products even create a false impression of being healthy through the addition of zero-calorie sweeteners, micronutrients, and reductions in sodium, enabling manufacturers to make health claims despite the product remaining nutritionally poor.¹¹ This contributes to the displacement of minimally processed foods and freshly prepared meals by ultra-processed foods and beverages.¹¹

Research has consistently linked high consumption of ultra-processed foods to unhealthy dietary nutrient profiles and several diet-related non-communicable diseases.¹¹ The health implications of UPFs are particularly relevant during childhood, a critical period of growth, development, and habit formation.^{12,13} During this stage of life, children have increased nutrient needs to support their physical growth, cognitive development, and overall health, and are establishing dietary patterns that often persist into adulthood.^{12,13}

Given the negative health implications of UPFs in school settings, research is needed to understand the prevalence of UPFs in schools. Understanding the extent to which UPFs are available to students can help inform future school nutrition policies and identify opportunities to create healthier food environments. One unanswered question is the prevalence of UPFs among competitive food sales. This study aims to assess the prevalence of ultra-processed foods and foods high in nutrients of concern sold in a sample of US elementary schools.

Methods

Data collection

This study analyzed competitive food sales data from elementary schools in Houston, Texas. The location was chosen based on data availability. The researchers of this study had access to competitive food sales data from Houston-area public schools that had previously been obtained by a Texas citizen through the Freedom of Information Act.

The data included product lists of all competitive “à la carte” food and beverage items sold to students during the 2024-2025 school year at all schools in the Houston Independent School District. Records of sales of each of these products during the 2024-2025 school year were also available. We sampled the top 50 elementary schools based on student enrollment, accounting for 39,730 students, and created an original dataset capturing sales and nutritional information for all competitive food and beverage products sold in these 50 schools during this timeframe. We created the dataset using Microsoft Excel.¹⁴

First, we entered the total sales of each product for each of the 50 schools. Next, we identified and recorded the nutritional information for all products. For each product, we entered the serving size, serving size unit, total fat, saturated fat, trans fat, sodium, total sugar, added sugar, and full ingredient list. The nutritional content for each product was pulled directly from the manufacturer-issued K-12 product databases when available.^{15,16} For branded products without dedicated K-12-specific information, data were obtained from manufacturer product databases or brand/retailer websites (e.g., Walmart).

For fresh or unbranded items (e.g., fruit cups or vegetables), we used the USDA Food Data Central for collecting nutritional information.^{17,18} Some school-prepared menu items did not have nutrition information available (e.g., barbecue sliders). In these cases, we identified a representative recipe from publicly available sources and determined nutrition information using a recipe-to-nutrition calculator.¹⁹

Data Analysis

Calculating Sales

Sales for each product during the 2024-2025 school year were compiled for all 50 schools. A value of “\$0” was assigned when there was no sale of the competitive item at a given school, while if there were any sales, the monetary value was entered. The total sales of each product across all 50 schools were then calculated.

UPF prevalence

We used the Nova Category 4 definition to classify products as ultra-processed, considering a product a UPF if it contained at least one of 12 specified cosmetic additives and/or non-culinary ingredients (e.g., anti-foaming agents, flavor enhancers).²⁰ The ingredient list for each product was imported into Stata,²¹ which was used to flag whether each product was a UPF or not. The percentage of products and sales that were categorized as UPFs were then calculated.

Smart Snacks Classification

Using the Smart Snacks standards established by the USDA (Table 1), we used Stata²¹ to flag each product as meeting the criteria or not. We categorized a product as not meeting Smart Snacks criteria if it did not meet 1 or more of the nutrient thresholds; we did not compare products against Smart Snacks’ food group criteria. We then calculated the percentage of products and sales that met Smart Snacks standards based on these categorizations.

Nutrients of Concern

To determine if a product was high in nutrients of concern (saturated fats, sodium, or added sugars), we compared the nutrient content of each competitive food item against the standards set by the proposed Food and Drug Administration (FDA) Front of Package Labeling (FOPL) rule.²⁵ This proposed rule would require that a front-of-package nutrition label be placed on most foods that contain a Nutrition Facts label, communicating whether the product contains low, medium, or high levels of nutrients of concern.²⁵ Low, medium, and high thresholds are defined by the FDA (Table 2); for example, a product would be considered high in sodium if it contains more than 460 milligrams of sodium. Any product that exceeds 20% or more of the daily value for each nutrient of concern would be classified as “high.” We chose this nutrient profiling scheme due to its policy relevance and potential for implementation in the U.S.

We used Stata to characterize whether each product was high in each of the nutrients of concern. We then calculated the percentage of products that would be classified as “high” in each of the three nutrients of concern under the proposed labeling scheme.

Table 1: USDA Smart Snacks Standards for school sales

Requirement ^a	Criteria
Step 1: Food group (must meet at least ONE)	• Grain product with ≥50% whole grains • OR first ingredient is fruit, vegetable, dairy, or protein • OR combination food containing ≥¼ cup fruit and/or vegetables
Step 2: Nutrient limits (must meet ALL)	• Calories:^b ≤200 kcal • Sodium: ≤200 mg • Total Fat: ≤35% of calories • Saturated Fat:^c <10% of calories • Trans Fat: 0 g • Total Sugars: ≤35% by weight

^a Products must meet both the food group requirement and nutrient standards.

^b According to the Code of Federal Regulations regarding calories in entree items, “Entrée items served as a NSLP or SBP entree are exempt [from this requirement] on the day of or day after service in the program meal.”²²

^c According to the Code of Federal Regulations 7 CFR 210.10, “Approved fluid milk options are excluded from the saturated fat requirement for competitive foods.”^{23,24}

Table 2: Proposed U.S. FDA “High” thresholds for nutrients of concern

Nutrient	Threshold equivalent to 20% daily value per serving
Saturated fat	4 g
Sodium	460 mg
Added sugars	10 mg

Results

A total of 79 á la carte products were sold in the 50 largest elementary schools by student enrollment in the Houston Independent School District in 2024–2025. One product was excluded due to insufficient information (stated as “fruit on day’s menu”), yielding an analytic sample of 78 products, which accounted for \$480,326 in total sales.

UPF Prevalence

Most products sold were classified as UPFs (82%, n=64), accounting for 99% of total sales (\$475,621) (Figure 1). Only 1% (\$4,706) of the sales came from unprocessed/minimally processed and/or processed foods, constituting 18% (n=14) of all products sold.

Smart Snacks Compliance

Most products met Smart Snacks standards (95%, n = 74), while 5% (n = 4) did not (Figure 2). Two products were above the Smart Snacks threshold for total sugar (Cherry Flavor Craisins and Watermelon Flavor Craisins), and two were above the threshold for both sodium and saturated fat (Domino’s Cheese Pizza and Domino’s Pepperoni Pizza). Of the total sales, 99% came from products that met the standards (\$476,950), with 1% from products that did not (\$3,376).

FDA Proposed Rule Thresholds

For the FDA proposed front-of-package label rule, 14% (n=11) of products exceeded the high-in added sugar thresholds, accounting for 30% of total sales (\$142,501) (Figure 3). For both sodium and saturated fat, 3% (n=2) of products were above the high-in threshold, accounting for 1% of total sales each (\$3,316).

Figure 3. Percentage of products and sales exceeding the proposed U.S. Food and Drug Administration front-of-package labeling “high” nutrient thresholds among competitive foods and beverages sold in elementary schools in Houston, Texas, during the 2024–2025 academic year (n = 78 products, total sales = \$480,326)

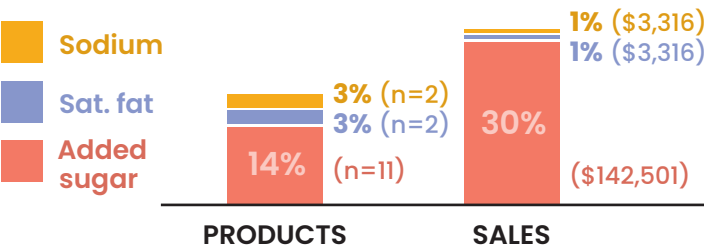


Figure 1. Nova classification of competitive foods and beverages sold in elementary schools in Houston, Texas, during the 2024–2025 academic year (n = 78 products; total sales = \$480,326)

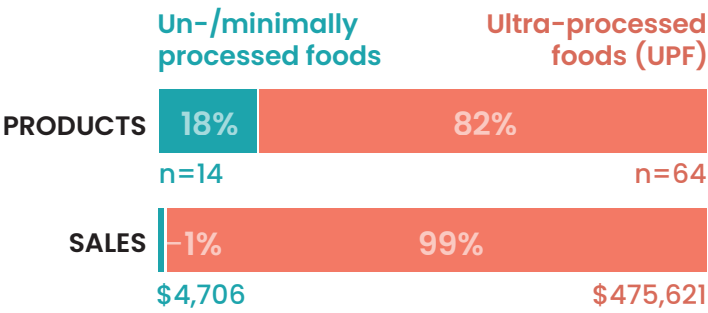
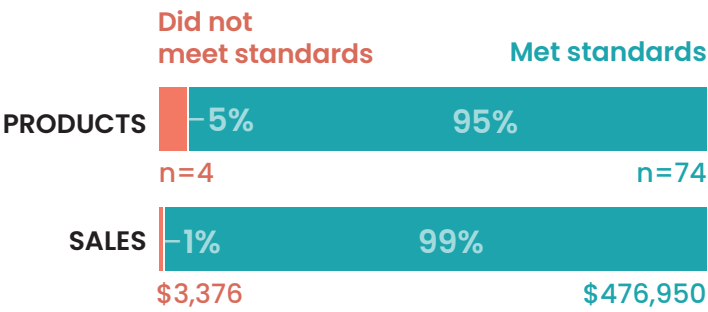


Figure 2. Compliance with Smart Snacks standards among competitive foods and beverages sold in elementary schools in Houston, Texas, during the 2024–2025 academic year (n = 78 products, total sales = \$480,326)



Discussion

UPF Prevalence

This study analyzed the prevalence of UPFs and foods high in nutrients of concern sold á la carte in 50 Houston elementary schools in 2024–2025. Findings demonstrated that 82% of products were UPFs, accounting for 99% of sales, totaling \$475,621 — a substantial and concerning amount given the potential health impacts of these products.

A previous study in the United Kingdom showed that UPF content in school meals and packed lunches was high in both elementary (72.6% kcal, 43.7% g) and secondary (middle and high) schools (77.8% kcal, 52.5% g).²⁶ The prevalence of UPFs in school environments was also high in other countries, such

as Brazil²⁷ and Mexico,²⁸ showing that our results reflect an issue that occurs not only in Texas, but worldwide. Because U.S. children consume as much as half of their daily calories at school,²⁹ these results are concerning, as frequent exposure to UPFs is linked to poor dietary profiles and negative health outcomes.¹¹

Given the high prevalence of UPFs sold in schools and the health harms associated with these products, our findings suggest that Smart Snacks standards may be improved by addressing not only the nutrient content of products, but also their degree of processing. Standards could restrict UPF sales based on the Nova 4 classification to further reduce their prevalence.

Smart Snacks compliance

Four products (5%) did not meet Smart Snacks Standards. This is alarming, since it is a federal law that products should comply with these standards.³⁰ The two noncompliant products were two different types of fruit snacks that were above the threshold for total sugar, and two different types of pizza that exceeded the threshold for both saturated fat and sodium. These nutrients of concern are key contributors to obesity and other negative health outcomes among children;^{31,32} therefore, stricter monitoring of compliance with Smart Snacks standards is needed to reduce the negative impact of exposure to these nutrients in school environments. Although compliance monitoring of competitive food sales is required in schools by state agencies,³³ our findings suggest that these efforts may be insufficient since products were still sold despite these regulations, accounting for \$3,376 in à la carte sales analyzed. Future research may explore whether compliance gaps exist among competitive foods sales in other schools to further evaluate strengthening the monitoring process.

FDA Proposed Rule thresholds

When compared to the proposed FDA rule identifying products high in nutrients of concern, only two of 78 products exceeded thresholds for sodium and saturated fat—an encouraging finding. Both products also did not meet Smart Snacks standards, suggesting these standards may be sufficient in identifying and restricting sales of products high in these nutrients of concern.

However, 14% of products exceeded the “high” daily value threshold for added sugar, accounting for 30% of total sales. A large body of research has linked added

sugar intake to adverse health outcomes among children, including weight gain, diabetes, and dental caries.³⁴ As such, Smart Snacks standards may wish to consider adding limits for added sugar content, as current standards only address total sugar.

Strengths and limitations

Strengths of this study include data obtained through the Freedom of Information Act, which allowed for analysis of actual competitive food sales in US elementary schools. Additionally, the use of the Smart Snack standards and the proposed FDA Front-of-Package Labeling rule allowed for policy-relevant frameworks with which to evaluate the healthfulness of products sold.

There were also several limitations of this study. First, we sampled the top 50 Houston elementary schools based on student enrollment, which excluded a substantial number of schools within the district, reducing the generalizability of our findings. Second, since the study relied on existing information, the accuracy of the results was dependent on the quality and quantity of the data provided by schools. Third, we only assessed UPF prevalence among à la carte product sales; future research should analyze UPF prevalence among all foods and beverages available at schools, such as through vending machines or USDA-provided school meals. Finally, for some competitive items, nutritional content was unavailable and had to be assumed, which may have reduced the accuracy of our results.

Conclusions

This study analyzed competitive food sales in elementary schools in Houston, Texas to determine whether products sold were ultra-processed, in compliance with existing school nutrition standards, and/or high in nutrients of concern. Findings offer valuable insights into the prevalence of ultra-processed foods sold in Houston elementary schools and the healthfulness of these products. This study contributes to existing research analyzing the healthfulness of the U.S. school food environment and strengthens arguments for stronger regulation of food products available at schools. Improved regulations could enhance the nutritional quality of food sold in schools and promote children’s health.

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