Ultra-Processed Foods in School Meals: Challenges and Opportunities

Healthy Eating Research

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Ultra-processed foods (UPFs) are ubiquitous in the U.S. food supply, while growing evidence shows that they harm children's health. Schools offer a promising setting to introduce UPF regulation and reduce the availability of UPFs. This brief explores the issue of UPFs in school meals and identifies opportunities and challenges to replace UPFs with more fresh and local foods. Replacing UPFs with less processed ingredients and more fresh foods requires a paradigm shift where schools move away from a heat-and-serve operation toward a model of preparing meals mostly from scratch. The brief discusses challenges schools may experience, and cross-sector recommended actions that contribute to the effort to remove UPFs and promote the transition toward more scratch cooking in schools.

Introduction

Although the term "ultra-processed food" is not new, attention to this topic has increased dramatically among scientists, journalists, advocates, and consumers in recent years.[1,2] Policymaker action has also increased recently, and from January to June 2025, 47 new state bills were introduced to restrict food additives or UPFs in school meals.[3] In light of this attention, there is a unique and timely opportunity to further explore the issue of UPFs in school meals, identify opportunities and challenges to reducing their use, and strengthen the nutritional quality of foods served in U.S. schools.

This brief is intended for researchers, practitioners, and partner organizations that provide technical assistance to schools on meals and food procurement. The aims are to: 1) understand UPFs, their health impacts, and how they fit into the context of school meals; 2) identify strategies to replace UPFs in school meals with feasible alternative options that include more fresh and local foods; and 3) recognize challenges that must be addressed for schools to successfully reduce UPFs and implement more scratch cooking. This brief concludes with suggestions for multi-sector actions to move forward and a list of research priorities.

Background

What are ultra-processed foods?

While there is no single definition of UPFs, they are generally identified as packaged foods made in factories that contain ingredients not found in home kitchens. Further, UPFs are made primarily from substances—such as oils, starches, sugars, or proteins—that have been extracted from whole foods, chemically modified, and reassembled through industrial techniques like hydrogenation, extrusion, or deep-frying. These processes are designed to make the foods hyperpalatable and visually attractive. UPFs also typically contain cosmetic additives (e.g., artificial colors, flavors, emulsifiers, and sweeteners) to mimic the taste and appearance of the whole foods they have replaced and to make the foods more appealing. Ultra-processing often damages the healthy components of whole foods, such as antioxidants and naturally occurring fiber. Finally, UPFs are typically formulated for prolonged shelf life, packaged for convenience, and marketed for mass appeal.

The United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA) are currently in the process of creating a streamlined definition of UPFs that can be applied in the USDA's Nutrition Assistance Programs

and other settings.[4] In the absence of a federally recognized approach for identifying UPFs, the most widely used definition is the Nova food classification system. The Nova classification system, developed by Dr. Carlos Monteiro and his team at the University of São Paulo, Brazil, categorizes foods into four groups based on their level of processing (see Table 1).[5] Dietary advice based on the Nova classification system encourages the consumption of largely unprocessed and minimally processed foods (Nova group 1), along with moderate amounts of culinary ingredients (Nova group 2), and processed foods (Nova group 3), while limiting the intake of ultra-processed foods (Nova group 4).

It is essential to recognize that the Nova classification system acknowledges the benefits of certain types of processing, such as fermentation, pasteurization, and canning, and distinguishes processed foods (Nova group 3) from UPFs (Nova group 4). The processes used to create Nova group 3 foods can extend shelf life, reduce food waste, and improve food security, particularly in settings where fresh food is not consistently available. The Nova classification system focuses on operational markers to identify when a product's level of processing crosses the line from Nova group 3 into Nova group 4, and the benefits of processing may become outweighed by the risk of negative health consequences.[5,6]

What are the health impacts of UPFs?

There is sufficient evidence to justify efforts to reduce intake of UPFs in the U.S.,[7] especially for children. UPFs account for more than half of children's food intake,[8,9] and there is growing evidence that UPFs harm children's health. Research suggests that consuming excess quantities of UPFs has both short-term and long-term harmful effects. Specifically, higher rates of UPF consumption are associated with lower diet quality,[10] obesity,[11,12] cardiometabolic conditions,[13] asthma,[14] and cognitive deficits.[15] Because of the growing evidence that many of the additives in UPFs are harmful and addictive, many are calling for their removal from the food supply.[16] Efforts are therefore also necessary to improve children's access to and consumption of alternative options, including nutritious, minimally processed foods.

Why focus on UPFs in schools?

There are several reasons to begin with schools when introducing UPF regulations. First, school nutrition regulations

Table 1: Nova Classification System

Nova group	Name	Description	Examples
1	Unprocessed or minimally processed foods	Foods available in their natural form or those that have been altered using basic processing methods, such as drying, freezing, or grinding	Fruits, vegetables, dry beans, pasta, and plain milk
2	Processed culinary ingredients	Substances extracted from foods in Nova group 1 that are commonly used in fresh food preparation and home cooking	Vegetable oils, butter, sugar, honey, and salt
3	Processed foods	Nova group 1 foods that have been modified through the addition of salt, oil, sugar, or other culinary ingredients, often while using preservation techniques such as canning, bottling, or non-alcoholic fermentation processes to increase shelf-life or enhance flavor	Canned fruits and vegetables, tinned fish, plain nut butters, cheese, plain yogurt, and freshly baked bread
4	Ultra-processed foods	Complex manufactured products that often include multiple ingredients as well as additives to enhance taste, appearance, or shelf-life	Carbonated soft drinks, shelf-stable packages of savory and sweet snacks, instant noodles, and many ready-to-eat breakfast cereals

can have a wide, positive impact on children in the U.S., as the National School Lunch Program serves over 29 million students each school day.[17] Second, there is evidence that changes in school meals have a measurable impact on children's diets, and school meal consumption is associated with nutritional benefits.[18] In particular, the improvements to nutrition standards following the 2010 Healthy, Hunger-Free Kids Act have resulted in improved dietary quality for all children and a reduced risk of obesity among children living in poverty.[19] Third, because school meals are required to reflect current dietary guidelines,[20] there is greater political will to regulate what children eat at school compared to what they eat in other settings or what adults eat.[21] Finally, the primary purpose of schools is to educate young people, and students cannot learn effectively if they are hungry or lack an adequate diet. Therefore, schools are the ideal venue to introduce nutritious foods to support children's physical and cognitive development.

How are school meals regulated?

Currently, there are strong nutrition standards for school breakfasts and lunches, as well as foods and beverages sold outside the school meal program during the school day (also known as "Smart Snacks in School").[20] To ensure balanced meals, schools are required to offer at least three meal components at breakfast (milk; fruit or vegetable; and a grain or meat/meat alternative) and at least five components at lunch (milk; fruit; vegetable; grain; and a meat/meat alternative). Among the options, students must select at least three meal components (one of which must be a fruit or vegetable) for the meal to be reimbursed with federal funds. Beyond the meal component requirements, school meal menus must adhere to limits on calories, sodium, and saturated fats, while also providing multiple categories of vegetables throughout the week. Additionally, there are limits on added sugars that will be phased in throughout the 2027-28 school year. See Table 2 for a summary of the school meal standards.

Table 2: Summary of School Meal Standards

Meal Component	Breakfast	Lunch
Fruits	☑ 1 cup daily ▸ 100% fruit juice allowed for up to ½ of total fruit serving	☑ ½ to 1 cup daily ▸ Varies by grade level ▸ 100% fruit juice allowed for up to ½ of total fruit serving
Vegetables	▸ Optional ▸ May be substituted for a grain component with additional requirements	☑ ¾ to 1 cup daily ▸ Must include variety across the week (dark green, red/orange, beans/peas [legumes], starchy, and other)
Grains	☑ 1–2 oz. equivalent daily ▸ Varies by grade level ▸ 80% of grains must be whole grain-rich (at least 50% of the grain in the product is whole grain)	☑ 1–2 oz. equivalent daily ▸ Varies by grade level ▸ 80% of grains must be whole grain-rich (at least 50% of the grain in the product is whole grain)
Meat / Meat Alternative	▸ Optional ▸ May be substituted for a grain component with additional requirements	☑ 1–2 oz. equivalent daily ▸ Varies by grade level
Milk	☑ 1 cup ▸ Fat-free or low-fat ▸ Flavored or unflavored	☑ 1 cup ▸ Fat-free or low-fat ▸ Flavored or unflavored

	Breakfast	Lunch
Nutrients		
Calories	☑ 350–600 kcal range depending on grade level	☑ 550–850 kcal range depending on grade level
Saturated Fat	☑ Less than 10% of calories from saturated fat (averaged over a week)	☑ Less than 10% of calories from saturated fat (averaged over a week)
Sodium	▸ Schools must meet progressively reduced limits	▸ Schools must meet progressively reduced limits
Added Sugar	▸ Schools must meet a phased reduction in added sugar through school year (SY) 2027-28	▸ Schools must meet a phased reduction in added sugar through school year (SY) 2027-28

How do school meal standards impact meal quality?

School meals are, on average, one of the healthiest sources of food for children in the U.S.[22] However, while the current school meal standards ensure students have access to foods from food groups that provide all the recommended nutrients addressed in the Dietary Guidelines for Americans (DGAs), there are no federal regulations concerning the level of processing of products or the presence of artificial colors, flavors, or sweeteners. As a result, food companies continue to reformulate many UPFs for school meals to align with updated nutrition standards by adding whole grains and reducing sodium and sugar levels. However, these reformulated products still contain artificial colors, flavors, and other additives. Examples of UPFs that have been reformulated to meet current school meal regulations include heat-and-serve products, such as French fries, pizza, and chicken nuggets, as well as ready-to-eat products, including breakfast cereals, breakfast pastries, and flavored yogurts. Therefore, while the school meal standards have led to healthier food choices for students, many UPF options continue to be available in schools.

A Roadmap for Progress in Reducing UPFs in School Meals

A long-term strategy is needed to help School Food Authorities (SFAs)—local entities that operate school meal programs—become less dependent on UPFs. State policies that restrict the use of UPFs in schools may serve an important role; however, restrictions are more likely to succeed if they are accompanied by support for introducing more whole, fresh foods into schools and investing in the necessary infrastructure, kitchen equipment, and culinary expertise to prepare meals from scratch. Replacing UPFs with less processed ingredients and more fresh foods requires a paradigm shift where schools move away from a heat-and-serve operation toward a model of preparing meals mostly from scratch. This will be a substantial change for many schools and will not be accomplished overnight.

There are many benefits to scratch cooking. Scratch cooking enables school food service staff to have greater control over the ingredients in their meals[23] and has been found to enhance taste, variety, and visual appeal.[24] Currently, however, there are limited data on the frequency of scratch cooking in schools. According to the USDA Farm to School Census, the majority of SFAs estimate that the proportion of meals made from scratch is fewer than 25%.[25] A recent state-based survey of SFAs in California found that 82% served scratch-cooked foods at least one day per week, while only 20% reported serving scratch-cooked foods daily.[26] Another study of eight states found that 17% of SFAs reported serving school-made, scratch, or modified scratch-cooked foods daily.[27]

To focus on setting achievable goals and making consistent progress, it is helpful to view scratch cooking as a continuum, ranging from heat-and-serve to fully scratch-cooked meals, with an emphasis on incremental changes to replace UPFs with scratch-cooked alternatives. Figure 1 provides definitions for each stage along the scratch-cooking continuum, highlighting the types of ingredients and culinary techniques employed. At one end of the continuum, "Ready-to-Eat" represents individual servings of pre-cooked items—such as a frozen, pre-cooked, individually wrapped frozen pizza that would align with Nova group 4—while bulk "Heat and Serve" may include several pre-cooked components from Nova groups 3 and 4 (e.g., frozen whole pizza [Nova group 4]). For both "Ready-to-Eat" and "Heat and Serve," there is minimal culinary manipulation beyond heating and serving the foods.

Figure 1: Scratch-Cooking Continuum

Source: Chef Ann Foundation (2025)

Along this continuum, "Foundational Speed-Scratch" combines multiple processed, ready-made foods together—most commonly from Nova groups 3 and 4, but it can include whole ingredients from Nova group 1—and requires some assembly (e.g., frozen pre-made pizza dough [Nova groups 3 or 4] assembled with canned marinara sauce [Nova group 3], shredded cheese [Nova group 3], and frozen vegetables [Nova group 1] before being baked on site). This represents the first step towards more scratch cooking through the assembly of multiple ready-made products.

"Fresh Speed-Scratch" recipes take this one step further by combining processed or ready-made products (Nova groups 3 and 4) with whole, fresh ingredients (Nova group 1) (e.g., frozen pre-made pizza dough with shredded cheese [Nova groups 3 or 4], as well as scratch-made marinara sauce [Nova groups 1 and 2] and fresh vegetables [Nova group 1]). Therefore, "Fresh Speed-Scratch" introduces more culinary techniques with the preparation of fresh ingredients.

Lastly, "Scratch-Made" recipes are prepared on site using whole, fresh, minimally processed, or processed ingredients (Nova groups 1, 2, and 3), such as a pizza with a high-quality dough, scratch-cooked sauce, fresh vegetables, and grated cheese. Notably, while bread products—including pizza dough and buns—can be made from scratch, purchasing fresh, less processed alternatives is typically recommended due to the tradeoffs associated with labor in the school kitchen setting.

Given the likely prevalence of UPFs in school meals, SFAs should consider taking an incremental approach to reducing UPFs, with the ultimate goal of serving fresh, whole, and minimally processed foods in school meals daily. Drawing upon lessons learned from the scratch-cooking continuum (Figure 1), SFAs should target "easy wins" where they can substitute new scratch-cooked menu items that are achievable with their current staffing capacity and kitchen equipment. One example is ranch dressing, which can be made in bulk ahead of time and is a popular condiment for many school meals. Another "easy win" is the adoption of more fresh speed-scratch recipes, such as nachos prepared with tortilla chips, canned beans, scratch-cooked nacho cheese sauce, and fresh toppings. Identifying these incremental changes enables SFAs to build capacity and cultivate buy-in among their staff as they transition to a menu cycle featuring more scratch-cooked recipes. Similarly, SFAs are encouraged to conduct taste tests with students for new menu items, fostering student engagement and participation in school meal programs. The following Resource Spotlight highlights several existing tools, recipes, and other resources available to schools.

Resource Spotlight

There are currently multiple resources available to schools that can effectively support reductions in UPFs and promote progression along the scratch-cooking continuum. For example, the Chef Ann Foundation's (https://www.chefannfoundation.org/) mission is to support school food professionals with the resources, funding, and support necessary to serve more scratch-cooked meals. The organization employs a system-change approach, providing resources and training across five key areas to strengthen scratch cooking: food, finance, facilities, human resources, and marketing. They also developed The Lunch Box (https://www.thelunchbox.org/), a free online resource library with scratch-cooked recipes, step-by-step guides, tools, and other resources to help schools improve their meal programs and convert to scratch cooking.

Additional resources include:

Institute of Child Nutrition

Healthy Kids Collaborative

USDA Team Nutrition

Project Bread

Challenges to overcome

Several barriers and challenges must be recognized and addressed for schools to successfully transition away from UPFs and toward more scratch-cooked meals. Healthier food options for schools must be identifiable, available, and affordable.

Identifying UPFs

First, schools will need support in identifying the UPFs currently sold by food companies and distributors to school meal programs. Current regulations require Nutrition Facts labels to include macronutrients, specific micronutrients, and ingredients on packaged food products; however, they do not require information on the degree of processing. Therefore, a labeling system that allows SFAs to identify UPFs is needed. A strategy to support schools—and the general public more broadly—is to add the processing status to the Nutrition Facts label or integrate this information into newly proposed front-of-package labeling in the U.S. Requiring a label that clearly communicates when a product is a UPF will serve as a catalyst for healthier product reformulation within the food industry. If this is not feasible in the short term, companies that sell products to schools must be required to provide sufficient information to SFAs to identify the UPF status of their products.

Availability of Alternative Options

Healthier alternatives to common UPFs must also be available to schools. As illustrated in the scratch-cooking continuum, cafeteria staff will need to find new products to replace the UPF ready-to-eat, heat-and-serve, and convenience products they currently use. This will likely require additional funding at the federal, state, and district levels, as well as forming relationships with new food vendors. In the absence of clearly identifiable UPF labeling, this shift will require technical training in distinguishing processed foods (Nova group 3) from UPF (Nova group 4) versions of the same foods. For example, plain yogurt is processed but is not a UPF; however, many yogurts (especially those marketed to children) are UPFs because they contain artificial colors and flavors. Similarly, some commercial nut butters are processed and contain only nuts, while others add high fructose corn syrup, which makes them UPFs. Some commercial whole wheat breads are processed, while others are UPFs. Food companies that sell to schools will need to ensure that they have non-UPF varieties of their products available for schools to purchase.

Financial Resources

Financial resources from the federal, state, and district levels will be needed to hire sufficient staff with the required culinary skills and obtain necessary upgrades to kitchen equipment and infrastructure. First, funding will be needed to overcome staff shortages by ensuring competitive salaries for school food personnel. Relatedly, labor models and job descriptions may need to be updated to reflect changes in responsibilities for on-site food preparation. Second, investments in staff training will also be necessary to remove UPFs and prepare more meals from scratch. In particular, culinary training will be required for staff to use professional kitchen equipment to prepare and cook ingredients. Additionally, food safety training can help to reduce concerns about handling raw foods in the school kitchen. Another specific, yet important, technical assistance need is teaching staff how to calculate USDA meal credits for scratch-cooked meals. Third, funding will be needed for the equipment and space to store, prepare, and cook with fresh ingredients. To support the development and expansion of functioning kitchens across the country, school kitchen infrastructure grants must employ flexible spending rules. For example, some schools may require funds to make structural changes to the kitchen layout, such as accommodating new refrigerators, food preparation space, or ovens.

Recommendations

Progress in removing UPFs from school meals will require the involvement of every sector that touches school food. Table 3 highlights key stakeholders across different sectors that can play an integral role in supporting healthier school meals, providing some examples of recommended actions that contribute to the effort to remove UPFs and promote the transition toward more scratch cooking in schools.

Table 3: Key Stakeholders and Corresponding Recommended Actions to Reduce UPFs in Schools

Key Stakeholders	Recommended Actions
Food producers, manufacturers of consumer packaged goods, and local food growers and producers	■ Provide ingredient lists on all products sold to schools. ■ Provide sufficient information on the package or in an online database to identify the level of processing. ■ Reformulate products from Nova group 4 to Nova group 3. ■ Develop alternative products such as "meal kits" for schools that include a combination of Nova groups 1, 2, and 3. ■ Partner with schools to provide unprocessed or minimally processed meal components.
School district boards of education, administrators, parents, and students	■ Request that all school food vendors describe products and their ingredient lists. ■ Participate in school wellness committees to create a comprehensive school health plan that includes the food served in the cafeteria. ■ Work together to provide feedback and suggestions related to reducing UPFs and supporting a transition to more scratch cooking.
School nutrition professional associations and nonprofit organizations	■ Serve as conveners at the national, state, and district levels to support changes in school meals. ■ Highlight success stories and supportive strategies to provide concrete examples of how districts have decreased their reliance on UPFs.
Federal government policymakers and the USDA	■ Require food manufacturers that sell USDA Foods to Schools to provide comprehensive lists of their products, including detailed descriptions of processing methods and ingredient lists. ■ Develop a federally recognized definition of UPFs and require food manufacturers to clearly identify UPFs on the Nutrition Facts labels and future front-of-package labels. ■ Recognize that a definition of UPFs that is focused exclusively on individual additives (e.g., artificial dyes) may lead the industry to remove the specific additives without addressing the broader issues of UPFs (i.e., other potentially harmful ingredients, high levels of sugar or salt). ■ Increase access to more fresh, local, and minimally processed foods for schools through more Farm to School grant opportunities and by strengthening USDA Foods in Schools with expanded cash-in-lieu and commodity letters of credit (CLOC) for unprocessed and minimally processed foods in schools. ■ Fund technical assistance and kitchen equipment; improve infrastructure to help schools transition to more scratch cooking operation models.
State and local policymakers and government agencies	■ Provide funding to help schools purchase more local produce and minimally processed ingredients to facilitate moving towards more scratch-cooked meals. ■ Support SFAs in the procurement of local produce by funding regional coordinators who can provide technical assistance and connect school districts to local farmers and producers. ■ Fund technical assistance and kitchen equipment; improve infrastructure to help schools transition to more scratch cooking operation models.

Research Priorities

Researchers play an essential role in the effort to transition away from UPFs and toward scratch cooking in schools. The following are three important areas for future research.

1. **Ongoing surveillance data to track which UPFs (and their harmful components) are being offered in schools.**
    - Establish a method to assess UPFs in schools based on available information. This may include identifying a list of UPF marker ingredients most frequently found in school foods, as well as other key variables, such as whether a food is branded to help identify foods made in factories instead of prepared in a kitchen.
    - Begin to assess the level of processing in the foods from the USDA Foods to School program distributed to schools. Although nutrition information for some products is publicly available from the USDA Food Databases, this information is not available for all products and brands offered by the program. By evaluating the current data status, researchers can make specific recommendations to the USDA regarding future data needs.
    - Include evaluations of UPFs in school meals as part of ongoing national assessments, such as the School Nutrition and Meal Cost Study (SNMCS).
    - Coordinate efforts across research groups that have access to school production records and procurement data.
2. **Understand the level of scratch cooking in schools.** Current estimates rely on self-reported measures, which may be subject to measurement bias due to the lack of a consistent definition of scratch cooking.
    - Develop and validate a universal, standardized definition of the scratch-cooking continuum and apply this updated definition to the most commonly served items in schools (i.e., identify variations of the food along the scratch-cooking continuum). This will enable researchers to conduct more nuanced analyses of UPFs in schools and support SFAs with potential strategies to transition from these food items in the continuum towards scratch-cooked.
    - Identify and analyze the relationship between the Nova classification system and the scratch-cooking continuum.
    - Develop toolkits for SFAs to help with their self-assessment of the level of processing of foods to identify opportunities for easy changes by first tackling the most frequent UPF dishes at breakfast and lunch.
3. **Conduct cost-benefit studies to track and evaluate the shift to more scratch cooking and fewer UPFs in schools.**
    - Calculate the cost at each level of the scratch-cooking continuum for the most common dishes and foods in each required meal component.
    - Include the cost of ingredients, time, labor, and necessary equipment to shift dish preparation along the scratch-cooking continuum.
    - Assess the cost and benefits of values-aligned procurement ingredients (e.g., local, organic).
    - Assess student selection, reported satisfaction, and plate waste at the different levels of the scratch-cooking continuum.

Conclusion

The current bipartisan interest in improving school food provides an opportunity to make significant changes to the nation's school cafeterias. The emphasis on identifying particularly harmful individual ingredients for removal is the first step in the strategy; however, there is a risk that the food industry will make simple reformulations and continue to sell UPFs to schools. Therefore, a comprehensive definition of UPFs that integrates the level of processing with nutrient-based guidance, or school meal regulations that combine limits to UPFs with strong, nutrient-based guidance, will be necessary to support both healthier product reformulation and the identification of UPFs. Additionally, approaches to improving the school food environment should limit UPFs while simultaneously supporting schools to move along the scratch-cooking continuum. This system-change approach will enable districts to adopt incremental adjustments in procurement, staffing, and menu planning, supporting the use of more fresh, whole, and minimally processed ingredients. Furthermore, increased investments in school food labor, kitchen infrastructure, and equipment will help ensure the long-term sustainability of these changes in school meals, ultimately reducing the presence of UPFs in schools. Key stakeholders will be instrumental in ensuring that schools can feasibly reduce UPFs and transition to more scratch-cooked dishes. Future research will be necessary to evaluate the impacts of these changes on children's diets and health outcomes.

About Healthy Eating Research

Healthy Eating Research (HER) is a national research program with funding provided by the Robert Wood Johnson Foundation. HER supports research to identify, analyze, and evaluate environmental and policy strategies that can promote healthy eating among children and prevent childhood obesity. Special emphasis is given to research projects that benefit children and adolescents and their families, especially among lower-income and racial and ethnic minority population groups that are at highest risk for poor health and well-being and nutrition- related health disparities. For more information, visit www.healthyeatingresearch.org or follow HER on Twitter at @HEResearch.

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