Recommendations to Improve Food Access for K-12 Students in the City of Seattle

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1. Introduction

Food insecurity is defined as "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways."[1] In 2023, about 18% (6.5 million) of U.S. households with children experienced food insecurity.[1] However, in half of these households, only the adults were considered food insecure due to parents shielding their children from the effects of living in a food-insecure household.[1] Despite shielding attempts, the impacts of low and very-low food security, such as reduced food quality, inconsistent meal patterns, and reduced food intakes, were experienced by children and adults in the remaining half of these households.[1] From 2022 to 2023, the prevalence of food insecurity among families with children under 6 years of age increased from 16.7% to 17.9%, disproportionately affecting single-parent and low-income families and those of racial/ethnic minoritized backgrounds.[1]

Several federal initiatives, including the National School Lunch Program (NSLP) and School Breakfast Program (SBP), the After School Supper and Snack Programs, and the Summer Food Service Program, have provided access to nutritious meals and snacks for thousands of U.S. children. Although these programs have been shown to ameliorate food insecurity,[2,3] gaps and inequities still exist. One non-federal initiative to address inequities in food insecurity is the Backpack Program (BPP), which entails the regular distribution of "backpacks" with food to children who attend K-12 schools in order to cover the gap in food assistance that occurs over the weekend. Backpacks typically include child-friendly, shelf-stable, prepackaged items like cereal, milk or juice, fruit, snacks, microwaveable instant foods, or canned soups. Since the inception of the first BPP in 1995, there has been a national proliferation of these programs to address the increasing weekend meal needs of children experiencing food insecurity.[4]

In 2022, Feeding America, the largest food bank in the US, estimated its BPPs served more than 54 million meals.[5] Despite providing millions of meals to food-insecure students nationwide, and some indication that BPP participation ameliorates food insecurity[6], lack of uniformity in service delivery and nutritional quality between programs has drawn criticism about their effectiveness and potential harm.[7–9] An evaluation assessing the nutritional quality of 9 nationally selected BPP menus using the Healthy Eating Index (HEI) - a measure of how well a diet aligns with the Dietary Guidelines for Americans (DGA), ranging from 0 (worst) to 100 (best) - found HEI scores ranging from 55 to 78, with a mean of 67.[10] This average score of the BPP menus was higher than the average HEI score for the diets of U.S. school-age children (mean score of 55) and for the U.S. food supply as a whole (score <60); however it could still be improved.[10]

The nutritional quality of BPP foods must be balanced with other factors like cost, accessibility, and children's perceived taste preferences.[11] Children's taste preferences may be influenced by various psychosocial factors, including age, cultural food traditions, meal preparation capability, and nutritional knowledge.[12–14] Encouraging healthy eating patterns at a young age can positively influence future dietary habits and potentially impact short and long-

term health outcomes.[14] As such, the opportunity to increase the nutritional potential of BPP menus warrants further investigation.

This report describes work conducted in partnership with the City of Seattle's Youth and Family Empowerment (YFE) Division, within the Department of Human Services, seeking to provide 'best practices' recommendations for their K-12 food access strategies (i.e., their BPP) to ensure that the food provided to students maximizes student choice while being nutritious, youth-friendly, and culturally responsive. The Weekend Hunger Bag/Backpack Program is funded through contracts between the City of Seattle's (YFE) Division and various organizations that meet the eligibility criteria set by the Human Services Department.[15] Applications are evaluated competitively, and selected organizations then distribute backpacks to several school partners. Organizations and schools are typically paired based on the geographic proximity of the school district, although some variations exist. The city of Seattle's 2024 Weekend Hunger Bag/Backpack contract language specifies that bags or boxes of food must contain "at least two meals per day for two days (for a total of four meals) with at least any three of the five main food groups, as identified by the USDA My Plate."[16] Results from a recent city survey among a convenience sample of BPP recipients revealed program and food satisfaction variability, with perceptions of food quality and quantity provided differing greatly between student and parent respondents.

The objectives of this project were: 1) To conduct a literature review on the impact of BPPs across the country and on children's taste preferences; 2) To explore the perspectives of food banks and school partners currently participating in Weekend Hunger Bag/Backpack Programs contracted with the City of Seattle's YFE Division, in order to identify facilitators and barriers to the operation and effectiveness of these programs; and 3) To assess the nutritional quality of sample backpack menus across the City of Seattle's provider organizations.

2. Literature review

2.1 Impact of BPPs

One of the main goals of implementing BPPs in a community is reducing food insecurity and its associated impacts. While implementation and evaluation approaches vary across studies, some positive impacts of BPP participation have been reported. A study conducted in 6 Title I elementary schools in Pennsylvania found that parent participants of their BPP experienced an 8% reduction in "food worry" and a 16% reduction in "food restriction" when provided weekend packs of perishable food and nutrition education materials, compared to the weeks in which they did not receive these items.[4] This BPP was unique in that it provided fresh foods with recipes to participants, instead of the typical non-perishable items. Moreover, differences were identified for those who participated in the Supplemental Nutrition Assistance Program (SNAP), in addition to BPP.[4] For SNAP participants, the addition of weekly packs was especially important towards the end of their monthly SNAP benefits allotment.[4] The likelihood of SNAP participants using the food from backpacks increased by 15% in week 3, and 16% in week 4, confirming that

SNAP benefits alone are often insufficient for families experiencing food insecurity.[4] A different BPP evaluation was conducted in Urbana, Illinois in 2011-2012. The findings showed that between October and December 13% of families in the BPP moved from low food insecure status to food secure, a statistically significant increase compared to only 5% of those not in the BPP.[6] Despite this, food insecurity remained in more than 50% of BPP families over the school year.[6]

While BPPs can positively impact participants' nutritional outcomes, opportunities exist to increase the nutritional value of the provided meals and snacks. For example, a study conducted in central Ohio conducted a nutritional analysis of their BPP, compared to USDA, NSLP, and SBP standards.[17] They found the HEI score to be 58.84, with requirements met for minimum calories, protein, fruit, grains, meat/meat alternatives, saturated fat, added sugars, vitamin C (for ages 1-8 years), and iron.[17] Some requirements were not met and included vegetables, milk, % whole grains, maximum calories, calcium, vitamin C (ages 9-13 years) and vitamin A.[17] The researchers identify feasible and cost-effective alternative solutions to the identified issues: replacing granola bars with instant oatmeal and "cheesy" pretzel sticks with whole-grain Goldfish, which increased the HEI score to 74.24, and increased the whole grains, protein, and fatty acids. However, the alternative solutions also increased the refined grains, sodium, and added sugars content and decreased the dairy component compared to the original BPP.[17] After implementing these changes, the cost of their BPP increased by only $0.02 while achieving higher HEI component scores.[17]

Another study of BPPs across the Montana Food Bank Network examined diet quality among children and adolescents participating in the program. The average HEI-2010 score for these programs was 58.65, which falls below what is considered a 'good' diet (score of 80 or above) and is slightly higher than the U.S. national average of 55 and what is considered a 'poor' diet (score of 51).[18]

There is evidence that BPPs can provide additional benefits outside of reducing food insecurity and increasing the nutritional value of diets. In 12 North Carolina counties, test scores and school absences data from elementary schools participating in weekend BPPs were analyzed.[19] Compared to statewide data, reading scores increased by 0.093 standard deviations (SD) within the schools participating in the weekend BPP.[19] A slight improvement in math scores was also observed (0.070 SD), but only the reading score increases were statistically significant.[19] These improvements were most noticeable among the "lowest performing students" in the 12 counties.[19] There were no statistically significant differences between absences in participating schools and the statewide average.[19]

Despite mixed results regarding the program's efficacy in improving household food security,[6] the reported benefits of BPPs appear diverse and significant in the course of a child's development. Such benefits include improvements in academic performance,[19] simplified access to nutrient-dense snacks for participants compared to nonparticipants,[17] and a decline in skipped meals paired with an increase in home-cooked meals.[4] Since childhood food preferences influence taste throughout the life course,[1] BPPs may play a role in encouraging children to try

nutritious foods they may otherwise not explore and promote an affinity for more healthful foods in the future.

2.2 Taste preferences

Research has shown that humans naturally have an innate preference for sweets.[20] This has been found to be true also for children. In a 2021 study analyzing the food preferences of children aged 4 to 6 years, researchers found that when given the option to select from "happy," "neutral," or "sad" faces, children gave more positive responses ("happy") to products high in carbohydrates and fat.[21] Other studies have analyzed the relationship between liking food items and consuming them among children. In a 2022 study, 61 children between the ages of 4-6 years were recruited to participate in two identical lab sessions where their liking ratings of 7 foods (chicken nuggets, ketchup, potato chips, grapes, broccoli, cherry tomatoes, and cookies) and 2 beverages (fruit punch and milk) were assessed as part of a multi-item meal before *ad libitum* consumption of the same items in a buffet-style setting.[22] Researchers noted that when using a 5-point hedonic scale, children rated high-energy-dense products greater than low-energy-dense foods.[22] Cookies had the highest rating (4.9 ± 0.3, out of a possible range of 1–5), and tomatoes had the lowest rating (2.8 ± 1.50).[22] When given the option to consume these same seven items *ad libitum*, where certain items compete for consumption, there was a stronger correlation between liking and consuming foods of lower energy density, with items that had a lower liking rating being eaten less (i.e. cherry tomato, broccoli, milk).[22] These observations highlight the importance of the foods provided in BPPs and the factors that should be considered to avoid food waste.

The naturally occurring sugars found in fruits may directly influence fruit preference and consumption among children. The USDA's Fresh Fruit and Vegetable Program (FFVP) provides elementary school children with extra fruits and vegetables after lunch. In a recent study, researchers analyzed fruit and vegetable preferences among students participating in the FFVP to identify if these preferences changed over time with repeated exposure.[23] Overall, fresh fruits received an "I like it" rating more than fresh vegetables (77.8% fruits; 38% vegetables; $p < 0.05$).[23] These results align with children's natural preference for sweet taste. On average, 96% of children selected that they liked red and green grapes, cherries, oranges, and red apples, as opposed to 59% for grapefruit, papaya, pomegranate, raspberries, and kiwi – all of which are comparatively less sweet and more sour.[23] The majority of participants in the 2021 study that analyzed the food preferences of children aged 4 to 6 years, also had a preference for fruits, over vegetables.[21] In terms of the most preferred vegetables, 70% of students selected that they liked romaine lettuce, cucumber, Bibb lettuce, and carrots, compared to only 13% for vegetables like Brussels sprouts, mushrooms, and beets.[23] It's worth highlighting that 42% of kindergarteners liked vegetables compared to only 33% of second graders.[23]

Food preferences also impact snacking, which is common among most children and teenagers in the U.S.[12] Results from the What We Eat in America (WWEIA) report based on data from the National Health and Nutrition Examination Survey (NHANES) 2017-2020 show that

93% of children and adolescents consume at least one snack on any given day.[12] Snacks alone provided up to 25% of total calories for almost half of 2- to 19-year-olds surveyed, which makes snacks a critical focus point for adequate nutrient intake among children and adolescents.[12] However, snacks can be a double-edged sword regarding the intake of specific nutrients. While snack consumers have higher intakes of fiber, calcium, iron, and potassium than non-consumers, they also have higher intakes of energy, carbohydrates, and added sugars.[12] This is because the foods most frequently consumed as snacks are energy-dense, including chips, baked and processed foods like cookies and brownies, candy, and sugar-sweetened beverages.[12]

A 2023 study assessed food consumption patterns among 9,000 U.S. teenagers using NHANES 2007-2018 data and the Minimum Dietary Diversity for Women (MDD-W) indicator.[13] Overall, the most consumed food groups were: grains, white roots, and tubers (~99%); milk products (~92%); and meat, poultry, and fish (~85%).[13] On the other hand, less than 10% of teens consumed vitamin A-rich fruits and vegetables and dark leafy greens (9.6%).[11] On average, teenagers only consumed 5 out of 10 food groups included in the MDD-W indicator.[13] In another study, researchers validated a food group indicator among adolescent boys and girls ages 10-19 years in upper-middle and high-income countries.[24] Researchers found that consuming ≥5 food groups best predicted micronutrient-adequate diets.[24] Thus, there is a lower likelihood that teens in the U.S. are consuming a diet that provides adequate micronutrients.

Aside from age, there is limited evidence regarding the differences in food preferences in children by other factors including socioeconomic status, race/ethnicity, and other demographics. The study assessing food consumption patterns of U.S. teenagers mentioned above showed that egg consumption was 25% higher for Mexican American teens compared to non-Hispanic white teens (CI: 1.05, 1.49; p= 0.015).[13] Additionally, Mexican Americans and Hispanic teens were 99% (CI: 1.66, 2.40; $p < 0.0001$) and 73% (CI: 1.33, 2.26; $p < 0.0001$) more likely to consume beans, peas, and legumes, respectively, compared to non-Hispanic white teens.[13] The consumption of nuts and seeds was highest among non-Hispanic white teens and teens from households with higher socioeconomic status (SES).[13] This could be explained by the higher cost of this food group, which is consistent with previous literature that identifies SES as a key determinant influencing eating behaviors.[14]

3. Methods

3.1 In-depth Stakeholder Interviews

We conducted interviews among two types of stakeholders engaged in the City of Seattle's BPP – food banks and school representatives. Our capstone partner, the YFE Division of the City of Seattle's Human Services Department, selected representatives from five food banks and one non-profit organization with active BPPs. All representatives were contacted for interviews via email. We received responses from 5 of the 6 representatives. Representatives from the schools were a convenience sample and mostly recommended by the food bank representatives. School representatives from seven different schools were contacted via email;

six were recommendations from food banks and one was known to a capstone team member. Of the seven school representatives contacted, six responded to our request for an interview. Ultimately, we conducted a total of 11 in-depth interviews, including 5 food banks and 6 school representatives.

We created separate interview guides for the two types of stakeholders which were revised through collaboration with team members. After the first interview with a food bank representative, the interview guide was revised to include additional follow-up questions for further clarity. This edited version of the interview guide was used for the remaining 4 interviews with slight changes as new information emerged. The questions aimed to gather information on topics such as foods provided in the backpacks, factors that influence food selection, familiarity with language in the most recent 2024 contract with the City of Seattle, metrics tracked, barriers, and operational details relating to the development and implementation of the program. For the school interview guides, the main questions were focused on key players involved in the BPP from the school's perspective, how the program operates, the purpose of the program, any feedback they have received from the participants (i.e., students and parents), and ideas for strengthening the program at the school. The team knew ahead of time that one of the schools to be interviewed used a food pantry model for the distribution of the BPP foods - i.e., they allowed students to choose which items they wanted from a bulk selection instead of providing a pre-packed food bag - and so we created a modified interview guide for this school.

We conducted virtual interviews (using either Microsoft Teams or Zoom) between 28 October and 08 November 2024. All interviewees gave consent to be recorded, and complete anonymity was kept through the transcription editing process. The interviews were conducted with one primary interviewer and one note-taker present, with debriefing sessions following immediately after each interview. A transcript for each interview was auto-created via Microsoft Teams or Zoom and subsequently edited.

A theoretical framework provided the development of *a priori* deductive codebooks, allowing for the addition of emergent inductive codes.[25] We independently tested the validity of the codebooks and revised them following testing. To test their validity, team members coded the same transcript independently and then discussed any changes that needed to be made. Among the food bank transcripts, all except for one were coded by two different team members. We developed key themes based on grounded theory.[25] Among the school representative transcripts, thematic coding and analysis was done, despite the significant differences found between each school. We applied broad themes with some data reported case by case.

3.2 Nutritional Analysis

After gathering sample menus from each of the food banks providing BPP services to the City of Seattle, we categorized menu offerings according to the food groups listed in the 2020-2025 Dietary Guidelines for Americans (DGA); i.e., vegetables, fruit, refined grains, whole grains, dairy and protein.[26] We then assessed each sample menu for nutritional adequacy, comparing the menu’s contents to the food group intake recommendations according to DGA’s

minimum caloric requirements for each age group: 1,200 calories per day for ages 5-8 years, 1,600 calories per day for ages 9-13 years, and 2,000 calories per day for ages 14-18 years. These calorie ranges were selected as the most conservative caloric intakes required for nutritional adequacy for each age category. Since the sample menus did not include precise serving sizes, we assumed that each item included in the menu was equivalent to one serving.

To provide a visual display of our analysis, we created a chart for each age range comparing the DGA's recommended servings of each food group for two days to our assumed number of servings provided by each program for two days. The number of servings provided by each individual BPP was divided by the DGA's recommended servings for each food group to determine the percentage of "recommendations met." The charts were color coded: red indicated the program met 0-33% of needs for that food group in a given age category, orange indicated the program met 34-66% of needs, yellow indicated the program met 67-95% of needs, and green indicated the program "met or exceeded recommendations" by providing 96-100%+ of needs.

4. Results

4.1 Thematic Analysis of Stakeholder Interviews

Five themes emerged during our transcript coding and analysis. Three themes were cross-cutting between both the food bank and school representative interviews, and two themes were stakeholder-dependent. The themes are described in detail below. Table 1 displays the characteristics of the schools interviewed.

- **Cross-cutting themes:**
    1. Plurality of food distribution methods at schools
    2. Incorporation of perishable food is highly desired but challenging
    3. Communication is vital to the success of the program
- **Stakeholder-dependent themes:**
    4. Constraints around food sourcing (food banks)
    5. More resources are needed to address barriers and maximize benefits (schools)

4.1.1 Cross-cutting theme 1: Plurality of food distribution methods at schools

The different distribution methods used within schools were discussed by both school and food bank representatives. Often these methods differed from the usual backpack distribution method that the food banks followed. One method mentioned was utilizing a food pantry, where students - and sometimes their families - could choose their foods, instead of bringing home a pre-made backpack/food bag. One interviewee from a school with an established food pantry commented, "*I have like 4 kids come in at a time. It can get a little chaotic, but we have things like one section is breakfast items. One section is all snack items. One section is like lunch and*

dinner items…I try to encourage them not to just think about what they want…but what their families need." (SCH3, school counselor). Food bank representatives noted the flexibility of this method to be a huge benefit to students and their families. One food bank representative noted: *"I think in many of these schools what's really needed is a pantry… that's open, you know, at pickup 2 days a week, and then you know, for 2 hours on the weekend, or one day from 7 to 9pm. After you know, work hours, or you know that families can see their school as a resource point for getting these needs met for their family, and that kids don't have to be directly involved in." (FB4)*

Food bank representatives also mentioned that providing items in bulk to schools - either unpackaged BPP foods or food sent in addition to what is provided from the BPP - allowed them to meet schools' specific needs and enabled schools to distribute all the food how they best saw fit. In fact, three schools that operate the BPP using a food pantry or "take what you need" model allow students to take as many items as they need, two of the three encourage students to pick items for their families, and one of the three invites family members to come pick up items themselves. However, according to food bank interviewees, the budget also impacted how much they could provide in bulk. As a result, some schools placed limits on what could be taken. One school has limits on certain items, such as taking a maximum of 4 items per section (i.e., lunch, breakfast). Additionally, one food bank representative mentioned that some schools like to keep extra food items in the office for kids who might not normally receive a backpack but need a snack. They said, *"some schools have asked me directly, like, can we keep it and give it to kids who need it some other time like, do you have an extra box of granola bars that we can keep in the office for kids that need a snack, you know things like that, so most of them will keep it and redistribute it." (FB4)*

Regardless of the model, "backpack" or "take what you need," schools do not have income eligibility criteria for utilization of the BPP. It is open to all students at all six schools interviewed. In most cases, however, it is students and families from lower socioeconomic backgrounds who regularly participate in this program. In two schools, priority is also given to special education students and their families.

4.1.2 Cross-cutting theme 2: Incorporation of perishable food is highly desired but challenging

All five food bank representatives expressed the desire to include more perishable foods in backpack menus. Fresh fruits and vegetables were mentioned most frequently, followed by dairy products and prepared sandwiches. Representatives noted the addition of perishable foods as a strategy to increase the nutritional quality of backpack menus, contribute to diet diversity, and potentially enhance family meal resources. This closely aligns with the schools' desire to provide more protein –including meat, dairy, eggs- and vegetables to their students, which was mentioned across all six schools interviewed. However, food bank representatives listed several barriers to their ability to include perishable foods. For example, one noted *"..in terms of, like, increasing refrigerated capacity. We do surveys, like share that out with school representatives,*

and let folks know that, like the refrigerated items are healthier and are really highly rated." (FB3)

Four food bank representatives cited uncertainties about schools' refrigerated storage capacity and committed staff to oversee distribution. Although some food banks had long-established relationships with a few schools to supplement backpack programs with produce, knowledge about the majority of school partners' desire and resource capacity was uncertain. Food bank representatives noted that the feasibility of supplementing perishable foods was dependent on a number of factors, including schools' commitment and staffing capacity. Electricity fees were mentioned by some school representatives as a barrier to providing perishable items, especially for those that had a large number of student participants. One school program coordinator stated, *"It's just the amount of food, the amount of perishables that we would need to keep in a fridge in order to provide those into the bags…We just don't have that amount of space. There's no money anywhere for fridges or the electricity for fridges, unfortunately." (SCH6, BPP Facilitator)*

Waste and food safety were mentioned as concerns in regards to perishable foods by both food banks and schools. For example, a food bank representative said, "*...if a kid leaves school at 3:30 and goes to an aftercare program for 2 ½ hours before their parent picks them up, and then they forget that it's in their backpack, and someone finds it on Saturday afternoon, and there's yogurt in it. It's a waste."(FB4)* Some school representatives reported attendance was a barrier to providing perishable items, particularly for those that only distribute food on Fridays. If students were absent, perishable items would remain in lockers unrefrigerated for multiple days, leading to food spoilage by Monday. Some schools also noted students did not properly follow waste disposal procedures for unwanted perishable items, adding to the janitor's daily workload.

Three food bank representatives reported cold storage limitations at their sites too, which directly influenced the choice of backpack contents and distribution timelines. These limitations were also acknowledged by schools, with one parent volunteer stating "*...when I picked up the boxes they were in an outside unrefrigerated space…It's 10 big banana boxes of food. So it's a lot to store anywhere" (SCH1, parent volunteer coordinator).*

All food bank representatives cited varying degrees of budgetary restriction. One reported the unfortunate necessity to eliminate supplemental produce, noting, *"but at some point, we started supplementing the schools with like extra produce, which is what they really appreciate…that's gonna have to be scaled back because we just, that's not what the program is for. And we don't have the budget for that." (FB5)*

4.1.3 Cross-cutting theme 3: Communication is vital to the success of the program

Throughout the interviews with food banks and school representatives, communication emerged as vital for menu planning, understanding student needs, and overall logistics. Communication between food banks and schools was cited as a major help when food bank staff were familiar with school staff. All schools have a designated person who communicates at least weekly with the food bank about how many bags/how much food is needed and what dietary modifications need to be taken into consideration. The number of bags is fluid and changes regularly when new families enroll in the school or when other families decide they no longer want/need to utilize this program.

One school representative mentioned that they would email and/or text the food bank representative asking for specific food items that their families need. There is also communication about keeping nuts or nut products separate from the food bags due to allergies, or special requests for alternative bags due to dietary restrictions (e.g., Halal, vegetarian/vegan). All school representatives mentioned that the relationship with the food banks had been established prior to their arrival at their respective schools. The communication that exists between the two stems from that pre-established rapport. Food bank representatives noted their difficulty maintaining contact with school employees in high turnover fields, but emphasized that relationships with school personnel are an asset to the program; the school's ability to gather feedback from BPP participants (i.e., students) and relay valuable information about school distribution and family needs were appreciated. FB3 representative noted that *"...turnover is pretty high at [Seattle Public Schools], and so it can be hard year to year if you have a social worker or school counselor who is leaving the school for whatever reason to try to carry the program over... [Administrators] knew who I was, and we were able to pretty quickly continue the program. So I think it's been helpful, building those relationships…"* FB4 representative relayed that school feedback is sometimes applied for avoiding waste or menu planning, stating, *"I do also just get feedback from the people I've built relationships with, you know, some of them will specifically say, like, Hey, no one seems to want this tuna like, can we do something else?"* The SCH5 representative provided an example of how robust relationships between food bank and school personnel can help address the specific needs of families by stating, "*I share with [FB staff] a lot of our families in need there, you know the basics, beans, rice, you know. I give her a list of items that if she comes across any, you know, Cilantro, please grab it.*"

Although feedback was deeply desired and valued, food bank staff acknowledged the rich feedback provided by schools required extra work from school staff. When asked about metrics tracked for the program, FB3 representative answered by acknowledging that schools' orders and dietary requests are tracked and that school surveys are valuable sources of information for menu planning, saying,*"…so right now, we're relying on the relationship that we build with school partners and asking them to like, sit down with students and fill [the surveys] out at school. When our partners have the capacity to do that, we get really good return rates. But for some people it's just not a possibility. And one of our schools has 181 students in the program this year. So it's just a lot to ask."*

Communication between school staff and families was also mentioned as important but requiring strengthening to increase reach. Some schools mentioned their sign-up forms were in English only, or were translated into only a few other languages, making this a potential barrier to non-English speaking families from knowing about this program or the alternative bag options. The school representative from SCH6 shared, *"I've translated this into 4 different or 3 different languages, for I guess English, I didn't really translate English, but we had it in English. So we had our 3 other - Oromo, Spanish, and Somali are the 3 other main languages spoken primarily by other families in our community, that has this exact same information on both. And I had translators read that because Google translate is lovely, but not always the most reliable."*

It was mentioned that communication with the families about the BPP could be improved because some parents do not use email, and kid paper mail (i.e., paper forms sent home with kids) is not that reliable. SCH1 representative addressed issues about reach and linguistic accessibility by stating,*"[W]hat can we do to reach all families? and so like, maybe offering next year translation on the form that goes out…And it's just like I'm just hearing more and more from other families that like "Oh, I I missed this," and even, you know, even when things go out. And the thing you put out is clear, like, it's just so easy for you know, an email to not get read because somebody doesn't have access to email or a kid paper mail to be missed because it's in a folder in a backpack…But yeah, just, just making it as widely known as possible."*

Overall, these findings emphasized the vitality of stable relationships between schools and food banks. Obtaining more robust feedback from schools requires additional work from school representatives and could be better supported. When feedback was obtained and shared, it was applied to address various aspects of the BPP including waste, dietary safety, family needs, and menu development.

4.1.4 Food bank-specific theme 4: Constraints around food sourcing

All five food bank representatives reported food sourcing as a barrier to menu development. Four listed Costco as their primary vendor and one had strongly considered opening a new Costco account. Price and product consistency were the primary drivers behind these purchasing decisions and a topic frequently discussed at monthly Food for Schools inter-organization meetings. One representative stated *"I think (what) would be really useful is a sort of like price index of the commonly used items that we're all including, just because it takes a lot of time to sort through and figure out who's got the best price for certain things."(FB3)*

Other noted avenues of food procurement included donations and food drives, Food Lifeline's 'Shop the Dock', and retail shopping at Grocery Outlet. These options were less reliable and considered supplemental short-term solutions. Backpack-targeted food drives, although infrequent, produced better results, as most food banks reported the need to acquire large reliable sources of specific pop-top canned goods, microwaveable mac and cheese, granola bars, and applesauce. One representative stated, *"the specifics of the types of food we need to include (in) food drives don't really help us unless we can be very specific with the list of what*

we ask people for, and can feel as if they're actually sticking to that list instead of cleaning up their pantry with whatever old stuff they have." (FB4)

Collectively, food procurement sources restricted the diversity of menu items in the MyPlate food groups. Vegetables, dairy, and protein options were the most limited due to vendor inventory, cost, substitution potential, and students' taste preferences. Whole grain product varieties and 100% fruit juice were prioritized if offered by Costco. However, shelf-stable proteins were especially challenging. Most food banks avoided purchasing items with beef and pork as a means to accommodate more dietary and cultural food requests. Peanut butter and tuna were reported as the most cost-effective options, yet some representatives excluded them from menu design due to concerns over severe nut allergies or likeability. One representative from FB2 stated, *"...because I'm never sure how extreme someone's peanut allergy, where it's to the point where we honestly, we generally tend to exclude it for something like that. But yeah, we're able to accommodate."* This representative further explained *"...single or individual servings of protein is usually the most difficult one. It's really easy to find carbohydrates in prepackaged food. And that's a problem, because everything comes loaded with unnecessary carbs, salt, sugar. So yeah, finding some sort of good shelf stable proteins can be a little tricky at times."*

Backpack Brigade was a notable resource for direct purchase of special dietary bags, particularly Halal. Some food banks used this targeted strategy to reduce expenditures and the need for additional food storage. Repackaged items (i.e., foods purchased in bulk and 'repackaged' into smaller portions for distribution), such as oatmeal, pasta, and vegetables were previously incorporated in some menus to reduce cost and increase diversity, yet had fallen out of favor due to limitations in staff, storage, and assumptions about students' meal preparation resources.

Finally, most representatives struggled with balancing the conflict between needing shelf stability and the desire to include less processed foods with lower sugar and sodium. One representative noted, *"We do a lot of canned fruit and so it's still like a lot of added sugar, but we do try to have like a fruit product in there or vegetable product. But yeah, I think that's something that we struggle with here as well as that. The products that we've been using from Costco are not necessarily the most nutritionally dense." (FB1)*

4.1.5 School-specific theme 5: More resources are needed to address barriers and maximize benefits

It is apparent that many of the existing barriers stated by school representatives are due to a lack of various resources. Among these resources, two were identified as catalysts to pre-existing barriers: human power and funding (financial resources).

Human power was identified as a main barrier in three of six schools. One school representative stated, *"...And one of our biggest barriers is just manpower, just manpower" (SCH6, Food Bag Facilitator).* All 6 schools use volunteers to help run the BPP. While these volunteers temporarily solve limits in human power, they may not be as reliable, or have the flexibility compared to employed individuals. These concerns were echoed by another school

representative, *"…And then, I don't know what we're gonna do when the parent decides she doesn't want to drive the stuff anymore" (SCH4, school social worker).* In addition, the SCH1 representative expressed that the mid-day food bag pick-up and delivery from the food bank to the school was difficult for parents and guardians who work during the day. To work around this, they noted that they recruit older, retired community members. Two school representatives also mentioned that a lack of human power resulted in the inability to distribute perishable items. For SCH2, loading 186 individual bags with perishable items is out of reach, "*…those items are going to go into the fridge. And then the next day it has to come out of the fridge and put it in, opening each bag and putting it, and it's a lot of work, and it's a lot of things" (SCH2, family support worker).* Even if human power resources are not limited, personal resources that volunteers have access to, such as transportation, may hinder food pick-up and distribution. For example, if a volunteer did not have a big enough car, they would likely be driving to and from the school twice in one day.

While committed volunteers can be consistent, there is always the possibility of them leaving on short notice. Thus, SCH6 stated their hopes for a more permanent, paid position to lead the BPP, such as the addition of a Family Support Worker (FSW) to their school. However, these types of positions would be difficult to obtain due to limited funding in public education. At the moment, existing employees with diverse roles take on the role of either leading or assisting with the BPPs at their schools. While this is beneficial since these employees likely have an excellent idea of their student body and its needs, this quickly results in employees being spread thin between the two or more roles they take on.

Limited funding is a barrier for other resources needed to distribute foods, specifically refrigeration. Three school representatives mentioned their inability to distribute perishable foods due to no refrigeration. Accessing refrigeration requires either sharing with nutrition services (previously done by SCH2), having a new fridge donated (SCH5), or buying a new fridge dedicated to the program, the latter likely being the least obtainable due to funding constraints.

Even if schools had the means to acquire a fridge, the school district may not be willing to pay for electricity to power the additional fridge. SCH6 mentioned supplying electricity to fridges not already paid for by the school is too expensive for the district to maintain. The SCH6 representative detailed this by saying, *"…. the amount of perishables that we would need to keep in a fridge in order to provide those into the bags. We just don't have that amount of space, and the district has to pay for electricity for those fridges, and even our mini fridges that we have... We get these interesting little notes after break time, that tells us we should not have mini fridges in our room. So, it's just turtles all the way down. There's no money anywhere for fridges or the electricity for fridges, unfortunately".*

Table 1: Characteristics of schools interviewed

School	Type	Interviewee (s) role in BPP	Proportion of students using the BPP	BPP Model
SCH1	Elementary School	SSW Parent Volunteer	32%	Food bags
SCH2	K-8 School	FSW	31%	Food bags
SCH3	Middle School	School Counselor	3%	Food-pantry
SCH4	High School	SSW	4%	"Take what you need"
SCH5	Elementary School	FSW Parent Volunteer	40%	"Take what you need"
SCH6	K-8 School	BPP Facilitator	8%	Food bags

BPP: Backpack Program
FSW: Family Support Worker
SSW: School Social Worker

4.2 Nutritional Analysis

For ages 5-8 years (Table 2), all BPPs reached or exceeded DGA recommendations for amount of fruit servings per weekend. The refined grains provided for ages 5-8 years were relatively close to or met the recommended intake. All organizations except for FB1, provided 75-175% of recommended refined grains intake. The whole grains provided also approached, but did not meet, recommendations for ages 5-8 years. Seven of the eight organizations provided 50-75% of whole grain recommendations. The eighth, FB3, provided only 25% of recommendations.

For ages 9-13 years (Table 3), only one BPP did not meet fruit recommendations (FB8, 67%). The remaining organizations met or exceeded recommendations per weekend. The majority of backpack programs met 60-140% of refined grain recommendations, with an outlier of 25% of needs met by FB1 for ages 9-13 years. Most whole grains provided for ages 9-13 year olds hovered between 40% and 80% of needs, with the exception of FB3 (20% provided).

For ages 14-18 (Table 4), most fruit, refined grain, and whole grain recommendations exceeded 50%. Percent of fruit recommendations ranged from 50% to 200%. While the refined and whole grain trends were fairly consistent across ages 5-13 years, they quickly became inadequate for ages 14-18 years. Only FB3 and FB8 provided 86% and 100% of refined grains, respectively. Yet no other refined or whole grains provided in the age group exceeded 58%.

Among all food banks and across all age groups, protein requirements were met the least. The maximum protein requirement met was 50% of weekend needs for ages 5-8 years by packs provided through FB5 and FB6. For ages 9-18 years, less than 38% of protein needs were met regardless of providers. Across all age groups, dairy requirements reached a maximum of 40% of weekend needs, again for ages 5-8 years through packs provided by FB6. Sample menus generally were low in vegetable content, with FB3 and FB5 providing 67% of needs for 5-13 year olds. All other sample menus provided under half the vegetable requirement for all age sets. The sample menus analyzed were found to meet the needs of children ages 14-18 the least.

Table 2. BPP sample menus vs DGA: Ages 5-8 years

Organization	Vegetable (rec 3 for weekend)	Fruit (rec 2 for weekend)	Refined Grains (rec 4 for weekend)	Whole Grains (rec 4 for weekend)	Dairy (rec 5 for weekend)	Protein (rec 6 for weekend)
FB 1	33%	300%	50%	75%	20%	33%
FB 2	0%	150-200%	75%	50%	20%	16%
FB 3	67%	200%	150%	25%	20%	16%
FB 4	0%	100-150%	100%	75%	20%	33%
FB 5	≥67%	300-400%	75%	50%	20%	50%
FB 6	0%	350%	75%	75%	40%	50%
FB 7	0%	150%	100%	75%	20%	33%
FB 8	33%	100%	175%	50%	0%	33%

Key: Percentage of DGA Recommendations Met by Backpacks

0-33% of recommendation met	34-66% of recommendation met	67-95% of recommendation met	Meets or exceeds recommendation

Table 3. BPP sample menus vs DGA: Ages 9-13 years

Organization	Vegetable (rec 3 for weekend)	Fruit (rec 3 for weekend)	Refined Grains (rec 5 for weekend)	Whole Grains (rec 5 for weekend)	Dairy (rec 6 for weekend)	Protein (rec 8 for weekend)
FB 1	33%	200%	25%	60%	17%	25%
FB 2	0%	100-133%	60%	40%	17%	13%
FB 3	67%	133%	80%	20%	17%	13%
FB 4	0%	67-100%	60%	80%	17%	25%
FB 5	≥67%	200-266%	60%	40%	17%	38%
FB 6	0%	233%	60%	60%	33%	38%
FB 7	0%	100%	80%	60%	17%	25%
FB 8	33%	67%	140%	40%	0%	25%

Key: Percentage of DGA Recommendations Met by Backpacks

0-33% of recommendation met	34-66% of recommendation met	67-95% of recommendation met	Meets or exceeds recommendation

Table 4. BPP sample menus vs DGA: Ages 14-18 years

Organization	Vegetable (rec 5 for weekend)	Fruit (rec 4 for weekend)	Refined Grains (rec 7 for weekend)	Whole Grains (rec 7 for weekend)	Dairy (rec 6 for weekend)	Protein (rec 11 for weekend)
FB 1	20%	150%	29%	43%	17%	18%
FB 2	0%	75-100%	43%	29%	17%	9%
FB 3	40%	100%	86%	14%	17%	9%
FB 4	0%	50-75%	43%	43%	17%	18%
FB 5	≥40%	150-200%	43%	29%	≤17%	27%
FB 6	0%	175%	43%	43%	33%	27%
FB 7	0%	75%	58%	43%	17%	18%
FB 8	20%	50%	100%	29%	0%	18%

Key: Percentage of DGA Recommendations Met by Backpacks

0-33% of recommendation met	34-66% of recommendation met	67-95% of recommendation met	Meets or exceeds recommendation

5. Limitations

There are several limitations to this project. One limitation is the number of schools interviewed. With only six schools, it is difficult to gain a true understanding of typical operations. It is clear that each school operates in their own unique way so having only a small number of schools participating limits the generalizability of our understanding. This makes it challenging to analyze and suggest specific recommendations across the entire school district, especially given that the schools did not represent the entirety of the districts within Seattle. Additionally, we did not interview any food provider organizations outside of the food banks such as the Hunger Intervention Program, Backpack Brigade, or Food for Schools group. A second limitation is the time constraint of only 10 weeks on this project. More time could have allowed for additional interviews for more robust information. In addition to this, and due to the time constraints, the food banks and schools that were interviewed were limited to a convenience sample. A third limitation to this project is the generalizability of the nutritional analysis. This analysis was based on sample menus of backpack contents, without specific brands or portion sizes provided so some assumptions had to be made. Thus, it is unclear if the analysis applies to

every "backpack" built by the different food banks and food provider organizations. However, a similar methodology to the one presented can be used to compare the nutritional quality of menus within and across other food provider organizations. Our final limitation for this project is the familiarity of the BPP among the representatives we interviewed; those who were in their role for a longer period of time were more familiar with the ins and outs of BPP operations.

6. Summary and recommendations

The results of our nutritional analysis indicated that the proportions of fruit, refined grain, and whole grain foods from the sample BPP menus generally met or exceeded 50% of age-appropriate DGA recommendations. However, proportions of protein, dairy, and vegetables, the most desired foods noted in stakeholder interviews, often fell below 25%. We observed a trend where the proportion of MyPlate categories met from foods in the sample BPP menus declined as students' ages and caloric needs increased. However, the nutritional analysis does not provide insight into factors that influence the operation of the BPP or the impact of the program within school communities. The emergent themes developed from our interviews with food bank and school representatives describe the complex dynamics involved in this context. Based on the combined results of this work, our recommendations for the City of Seattle and the BPP are as follows:

Recommendation 1: Enhance the nutritional content of the food provided to better meet needs

- **We recommend bag contents be tailored to meet caloric needs of age groups defined by the DGA (5-8 years, 9-13 years, 14-18 years).** Overall, the proportion of MyPlate categories met per bag declined as age and caloric needs increased. Though not included in the Results section as a major theme, tailoring bags by age group was also indicated as an interest of food banks, and could be a valuable way to more completely support the needs of children at various stages of growth and development. We suggest providing bags developed in accordance with calorie needs of 5-8 year olds (1,200 calories per day) to elementary schools, 9-13 year olds (1,600 calories per day) to middle schools, and 14-18 year olds (2,000 calories per day) to high schools.

- **We recommend agencies add dairy and vegetables to bags.** Fruit, whole grains, and refined grain requirements were almost fully met by most agencies. The addition of vegetables and dairy or fortified plant-based milks might provide balance to backpack contents and be more attainable than the addition of protein. Food bank representatives acknowledged the difficulty of sourcing cost-efficient single servings of fortified plant-based milks; we recommend the inclusion of these products to enhance the nutritional impact of backpacks whenever possible for food banks.

- **The addition of shelf-stable proteins such as peanut butter, protein-fortified oatmeal, lentils, beans, canned fish, or dried meats could be valuable.** Overall, our nutritional analysis indicated that all sample menus were deficient in protein for all age groups, and protein foods were highly desired by schools and families, per the City of Seattle's more recent survey. Food bank representatives acknowledged in interviews that sourcing shelf-stable proteins was a challenge; we recommend discussing with schools – and, if possible, families served as end consumers – if pre-existing assumptions such as lack of cooking capabilities are factual, or if dried versions of protein-rich foods (e.g., beans, lentils) could be included in bags

Recommendation 2: Increase inter-organizational resources

- **We recommend increasing infrastructure to help with food banks' buying power** and better align with part 1.C of Seattle's Food Action Plan (FAP), to "Strengthen the Capacity of Meal Programs & Food Banks."[27] Additional infrastructure, such as vehicles with ability to transport multiple pallets of food, shared warehouse space, and funding to support additional staffing and vehicle maintenance, would help overcome the transportation and/or storage limitations food banks face. Implementing these changes will enable food banks to purchase items for cheaper from the Backpack Brigade or a wider variety of distributors. Furthermore, increasing the refrigeration capacity for shared vehicles and warehouses would enable food banks to purchase and store more perishable foods.

- **We recommend creating a "buying index," which would further enable food banks to consolidate their purchasing power.** Bringing together the information each food bank has on where the best-priced items are in one shared space would help with budgeting and food sourcing, which in turn would work to increase the variety and quality of products that food banks can offer to schools. Having access to a greater variety of distributors gives the food banks more autonomy in choosing the best-priced and best-quality products, and equips them to update the school menus to better meet the nutrition needs of the students.

Recommendation 3: Strengthen communication between the city, schools, and food banks

- **We recommend each school create structured methods for families to provide feedback to the school, that can then be disseminated to the food banks.** The mode used for communication of feedback can be decided by food banks and school representatives, but we recommend that the feedback be requested at scheduled intervals (e.g., a short survey sent once or twice a year). We also recommend providing an "open" channel of communication for families to provide anonymous feedback at any time (e.g., a comment box available during family-teacher conferences).

- **We recommend that key information from the contract between the City of Seattle and the food banks/providers be disseminated to all school district managers involved in the BPPs.** This is to ensure that all stakeholders involved in BPPs are well versed in the contracts that bind Seattle Human Service Department's YFE Division with food banks. There is already limited communication between schools and the City of Seattle, thus we hope this recommendation could facilitate further communication between those stakeholders.

Recommendation 4: Support flexibility in backpack program model design

- **We recommend food banks/providers design a limited menu of feasible BPP models, including the standard BPP** (ie.. providing bags of food meant to cover at least two meals for 2 weekend days), **receiving BPP food contents in bulk** (not in prepackaged bags or food sent in addition to backpacks)**, and the food pantry/'take what you need' model.** Based on interviews with food bank representatives, constraints around food sourcing and other resource limitations have been identified as barriers to program delivery. Creating a limited menu of executable model options would help food banks to better allocate existing resources such as funding, storage capacity, and volunteer staffing. The 'standard BPP' model may best fit the needs of schools with limited resource capacity.

- **We recommend that schools have the opportunity to choose the backpack model that best fits their needs.** The existing variation of school food distribution models underscores the need for flexibility in the current system. Including school representatives in the decision-making process validates their expertise in understanding how best to support the communities they serve. However, it is important to note that the consistency of nutritional quality in the foods provided to students is easiest with the standard BPP model - intended to provide at least two meals for two weekend days.

- **For stakeholders opting for a food pantry model, we recommend them to consider their primary end users.** School representatives reported students' avoidance of pantry foods like fresh vegetables, heavy canned goods, or foods that did not appeal to their taste preferences. However, these 'avoided' foods are more nutritionally sound. For the purpose of keeping the integrity of the BPP, we recommend to organize food pantries as the BPP - by 'meal bundle' options (ie. breakfast, lunch, and dinner), and instruct students to choose 2 of each meal type. This option meets and exceeds compliance requirements with 2024 contract language. The food pantry model also supports the inclusion of non-perishable foods such as dried legumes, beans, quinoa, and rice, which may help boost the food resource needs of students' families.

References

1. USDA ERS - Key Statistics & Graphics. Accessed October 12, 2024. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/#children
2. Cohen JFW, Hecht AA, McLoughlin GM, Turner L, Schwartz MB. Universal School Meals and Associations with Student Participation, Attendance, Academic Performance, Diet Quality, Food Security, and Body Mass Index: A Systematic Review. *Nutrients*. 2021;13(3):911. doi:10.3390/nu13030911
3. Marcus M, Yewell KG. The Effect of Free School Meals on Household Food Purchases: Evidence from the Community Eligibility Provision. *J Health Econ*. 2022;84:102646. doi:10.1016/j.jhealeco.2022.102646
4. Ryan RM, Gassman-Pines A, Steimle S, Baker G, Hines CT, Johnson AD. The role of public and private food assistance in supporting families' food security and meal routines. *Child Youth Serv Rev*. 2023;150:106994. doi:10.1016/j.childyouth.2023.106994
5. BackPack Program | Feeding America. Accessed October 12, 2024. https://www.feedingamerica.org/our-work/hunger-relief-programs/backpack-program
6. Feise B. *Back Pack Program Evaluation*. Feeding America; 2012. https://www.feedingamerica.org/sites/default/files/2018-10/backpack-program-evaluation.PDF
7. Fram MS, Frongillo EA. Backpack Programs and the Crisis Narrative of Child Hunger—A Critical Review of the Rationale, Targeting, and Potential Benefits and Harms of an Expanding but Untested Model of Practice. *Adv Nutr*. 2018;9(1):1-8. doi:10.1093/advances/nmx008
8. Fram MS, Frongillo EA. Moving Beyond Giving Free Food: Specific Targeting and Tailoring in Response to Child Food Insecurity. *J Acad Nutr Diet*. 2021;121(1, Supplement):S74-S77. doi:10.1016/j.jand.2020.07.024
9. Burke M, Cabili C, Berman D, Forrestal S, Gleason P. A Randomized Controlled Trial of Three School Meals and Weekend Food Backpacks on Food Security in Virginia. *J Acad Nutr Diet*. 2021;121(1, Supplement):S34-S45. doi:10.1016/j.jand.2020.10.026
10. Harnack L. *Report to Feeding America: Evaluation of the Nutritional Quality of BackPack Program Menus*. Feeding America; 2012:10. https://www.feedingamerica.org/sites/default/files/2018-10/backpack-nutrition-analysis.pdf
11. Laquatra I, Vick B, Poole A. Assessing the Nutrition and Family Usage of a Backpack Food Program. *J Hunger Environ Nutr*. 2019;14(6):810-822. doi:10.1080/19320248.2018.1546250
12. Hoy MK, Sebastian RS, Goldman JD, Moshfegh AJ. Snack Consumption by U.S. Children and Adolescents. In: *FSRG Dietary Data Briefs [Internet]*. United States Department of Agriculture (USDA); 2024. Accessed October 6, 2024. https://www-ncbi-nlm-nih-gov.offcampus.lib.washington.edu/books/NBK603800/
13. Jenkins M, Jefferds MED, Aburto NJ, Ramakrishnan U, Martorell R, Addo OY. What Do United States Adolescents Eat? Food Group Consumption Patterns and Dietary Diversity from a Decade of Nationally Representative Data. *Curr Dev Nutr*. 2023;7(8):101968. doi:10.1016/j.cdnut.2023.101968
14. Scaglioni S, De Cosmi V, Ciappolino V, Parazzini F, Brambilla P, Agostoni C. Factors Influencing Children's Eating Behaviours. *Nutrients*. 2018;10(6):706. doi:10.3390/nu10060706

15. 2019 Food and Nutrition RFP - Human Services | seattle.gov. Accessed December 7, 2024. https://seattle.gov/human-services/for-providers/funding-archive/2019-food-and-nutrition-
16. Walsh S. Student Nutrition Capstone Project. powerpoint presented at: October 2024.
17. Nonguierma E, Lesco E, Gunther C, Knopp M, Harb C, Hopkins LC. Improving nutritional content of backpack meals to reduce child food insecurity: a partnership model. *J Hunger Environ Nutr*. 0(0):1-12. doi:10.1080/19320248.2024.2375198
18. Byker C, Smith T. Food assistance programs for children afford mixed dietary quality based on HEI-2010. *Nutr Res*. 2015;35(1):35-40. doi:10.1016/j.nutres.2014.10.009
19. Kurtz MD, Conway KS, Mohr RD. Weekend feeding ("BackPack") programs and student outcomes. *Econ Educ Rev*. 2020;79:102040. doi:10.1016/j.econedurev.2020.102040
20. Keskitalo K, Knaapila A, Kallela M, et al. Sweet taste preferences are partly genetically determined: identification of a trait locus on chromosome 161. *Am J Clin Nutr*. 2007;86(1):55-63. doi:10.1093/ajcn/86.1.55
21. Kostecka M, Kostecka-Jarecka J, Kowal M, Jackowska I. Dietary Habits and Choices of 4-to-6-Year-Olds: Do Children Have a Preference for Sweet Taste? *Children*. 2021;8(9):774. doi:10.3390/children8090774
22. Keller KL, Shehan C, Cravener T, Schlechter H, Hayes JE. Do children really eat what they *like?* Relationships between liking and intake across laboratory test-meals. *Appetite*. 2022;172:105946. doi:10.1016/j.appet.2022.105946
23. Masis N, McCaffrey J, Johnson SL, Chapman-Novakofski K. Evaluation of Preferences Among Students Participating in the US Department of Agriculture Fresh Fruit and Vegetable Program. *J Sch Health*. 2021;91(5):401-409. doi:10.1111/josh.13015
24. Hanley-Cook GT, Hoogerwerf S, Parraguez JP, Gie SM, Holmes BA. Minimum Dietary Diversity for Adolescents: Multicountry Analysis to Define Food Group Thresholds Predicting Micronutrient Adequacy among Girls and Boys Aged 10–19 Years. *Curr Dev Nutr*. 2024;8(3):102097. doi:10.1016/j.cdnut.2024.102097
25. Tolley EE, Ulin PR, Mack N, Robinson ET, Succop SM. *Qualitative Methods in Public Health: A Field Guide for Applied Research*. John Wiley & Sons, Incorporated; 2016. Accessed December 6, 2024. http://ebookcentral.proquest.com/lib/washington/detail.action?docID=4461564
26. Dietary Guidelines for Americans, 2020-2025.
27. Food Action Plan - Environment | seattle.gov. Accessed December 5, 2024. https://www.seattle.gov/environment/food-policy-and-programs/food-action-plan